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July, 194

MODERN Machine Shop

VOLUME 17 • NUMBER 3

AUGUST, 1944

Contents

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War urgency has led to a phenomenal stepping-up of speeds and feeds on lathes, planers, slotters and shapers. Some operations are now being done on the same equipment in half or even less the time which was thought to be "required" in prewar days. Still in no case have they reached the ultimate capacity of their ARMSTRONG TOOL HOLDERS.

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MODERN Machine Shop

AUGUST, 1944

VOL. 17, No. 3

CINCINNATI, OHIO

We Present---

—as the feature article in this month's issue—an interesting story titled "Possibilities of the Master Tooling Dock." The author of the article, Leland A. Bryant, Consulting Engineer, Consolidated Vultee Aircraft Corporation, who is also the inventor of the master tooling dock, details the construction of this revolutionary piece of aircraft assembly equipment which it is predicted will comprise an important item in the tooling for a wide variety of peacetime products.

—on page 138—an article by J. D. Armour, Chief Metallurgist, Union Drawn Steel Division, Republic Steel Corporation, telling how the machinability and other qualities of cold finished steels have played an important part in building the arsenal of Democracy.

—on page 160—an unusual story regarding the forming of the "World's Heaviest Span Heads." Written by Bartlett West, this article describes the operations necessary in the spinning of these heads which were made by the Flanging Department of the Lukens Steel Company for use in the construction of petroleum reactors.

—on page 172—a discussion by Fred W. Lucht, Development Engineer, Carboloy Company, Inc., of the merits of hand honing of carbide tools. The author explains how by honing a slight chamfer on the cutting edges of cemented carbide tools, the life of such tools, on many jobs, can be appreciably increased.

—on page 178—a description of the method employed by the Lincoln Electric Company, Cleveland, Ohio, to reduce absenteeism by the careful investigation of causes, including the use of personal interviews which provide a wealth of information that could never be obtained from cold records alone.

—on page 186—an assortment of "Ideas from Readers" selected for their usefulness to the shopman in helping to solve his problems of safety, speed, and accuracy in production. The "New Shop Equipment" section and other features follow.

Possibilities of the Master Tooling Dock

In this article the designer presents details of a piece of equipment which it is predicted will comprise an important item in the tooling for a wide variety of products.

By LELAND A. BRYANT,

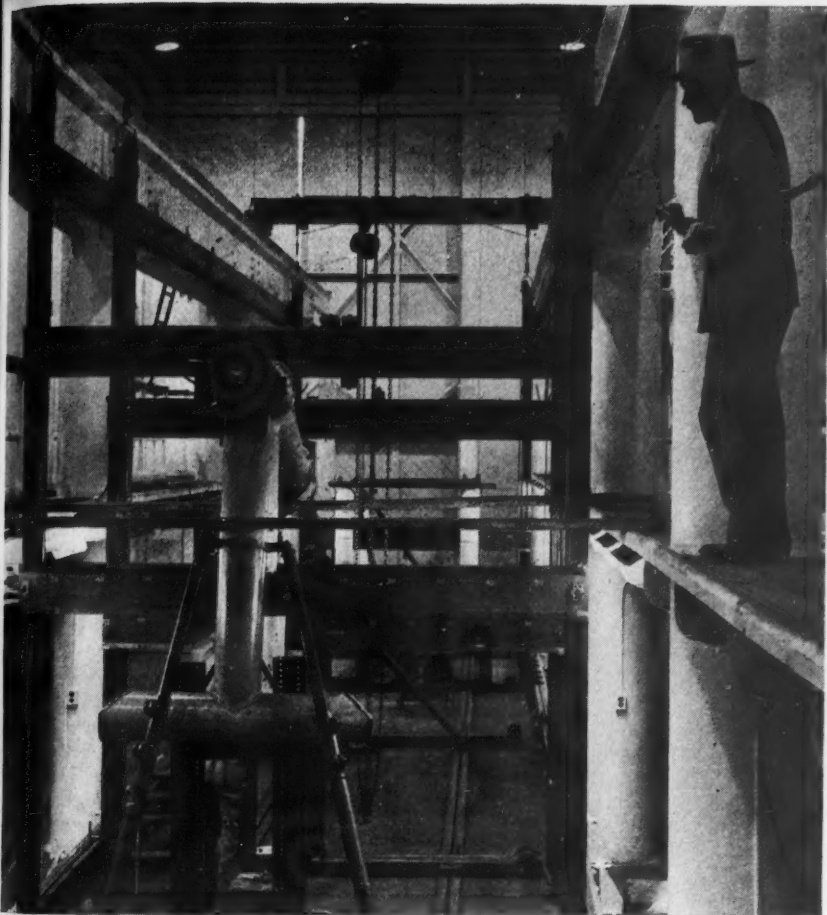
Consulting Engineer, Consolidated Vultee Aircraft Corporation

IT has been said that the Master Tooling Dock will make it possible, after the present war, for manufacturers to build light airplanes faster and better than automobiles were constructed in 1941. This is somewhat misleading, because the possibilities of the dock are not confined to aircraft. Automobiles, ships, tractors, streamlined railways cars, and many similar structures can also be produced faster and better than ever before—for the simple reason that this new technique makes possible a complete and ideal manufacturing breakdown of a product to a sequence of simple operations, the progressive co-ordination of which is automatically assured.

The tooling dock lifts assembly toolmaking from the level of an art to a science, thereby eradicating human fallibility—which has been the bugaboo, if not the barrier, to the provision of the ideal manufacturing breakdown for low-cost production. The principles of the dock can be advantageously utilized by any manufacturer whose production depends on the development of precise and co-ordinate assembly tools and gages.

Besides providing a mechanical means for setting the locators on assembly fixtures of all types, the dock is now being used for jig boring, loft scribing, and contour mastering with heretofore unheard-of speed, accuracy, and economy. It has so great-

Leland A. Bryant, author of this article and inventor of the Master Tooling Dock, has been contributing to American aeronautical progress since he was a student at Columbia University in 1909. With Glenn Curtiss in 1914, he filed a patent application for the world's first aircraft engine supercharger. He has designed and built a number of airplanes, and in 1930 he conducted extensive research and development on pressed metal and stressed skin airframe construction in collaboration with Gerald Vultee. Since 1939, he has confined himself to the tooling branch of the aircraft industry. Authorities claim his tooling dock is the greatest contribution to industry since the development of the mechanized assembly line.



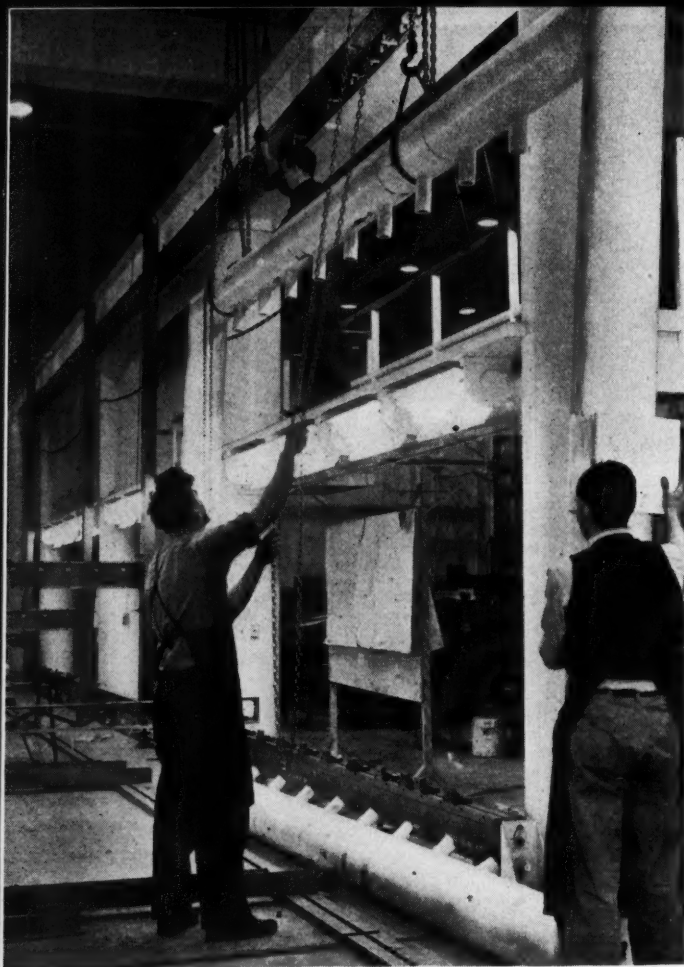
Inventor Leland A. Bryant Inspects the Large 60-Foot Unit of His Master Tooling Dock at San Diego, California. This Unit was Built for Consolidated Vultee Aircraft Corporation

ly reduced the cost of aircraft tooling that Consolidated Vultee engineers now find it practical to build even prototype airframes on the basis of an efficient manufacturing breakdown.

The Master Tooling Dock is a three-dimensional positioning device, which makes the job of finding a point in space almost as simple as finding the center of a sheet of paper with diagonal straight lines. A concrete and steel frame, it utilizes four fixed

longitudinal straight edges to represent length dimensions; two movable vertical straight edges to represent height dimensions, and two transverse straight edges to represent width dimensions.

The straight edges are physical members, designed to project the grid lines of the master loft or body plan into the third dimension. In one side of each of the straight edges is a series of bushed holes, jig-bored on exact 10.000-inch centers. The cen-



First Operation in the Construction of the Master Tooling Dock: a Fixture Is Moved into the Dock by Means of Dollies and an Overhead Crane

to the straight edges with ground pins, and the remaining holes make it possible to locate suitable fittings at specified points on the straight edges. The fittings are used to position and hold the movable straight edges in the desired locations, and to establish the third dimension in space—whence the jig or fixture locator may be positioned.

Using strip templates enables an aircraft factory to begin tooling for a new airplane as soon as the

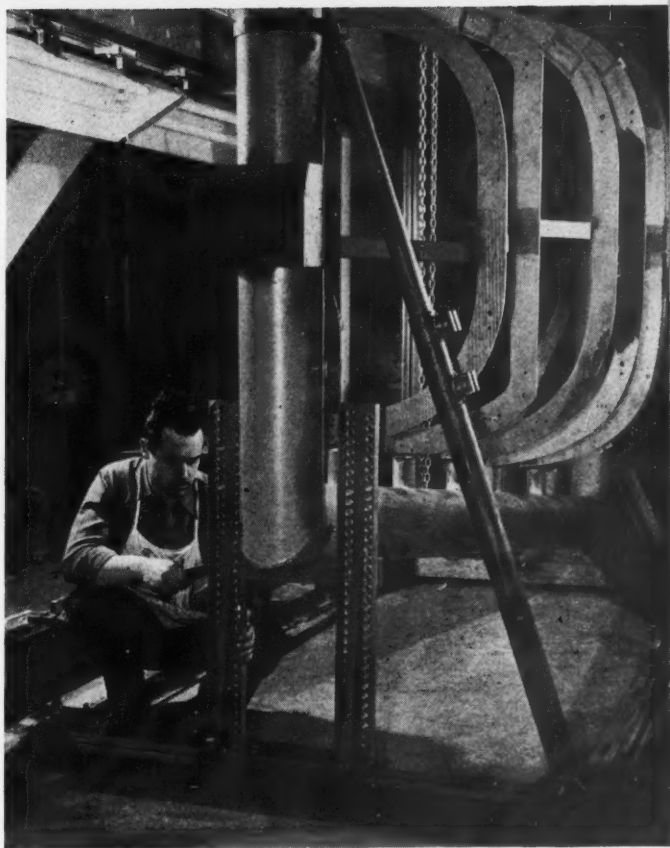
ters of the holes locate the grid lines, so that the movable straight edges can be positioned with proper relationship to one another and the fixed straight edges.

Exact dimensional control is attained in the Master Tooling Dock by means of "strip templates." These templates are strips of steel plate with holes drilled to specified locations in one margin and holes drilled on 10.000-inch centers in the other margin. The 10.000-inch holes make it possible to attach the templates

basic dimensions of the craft are frozen in design. In their entirety, these accessories are to the tooling dock what the phonograph record is to the phonograph. Besides being remarkably simple and easy to fabricate, they provide automatic co-ordination for an entire tooling program with unprecedented accuracy.

Before the Master Tooling Dock was introduced, the tolerance observed in tooling varied widely in accordance with the nature of a job. When close tolerances were required,

Second Operation in the Building of the Master Tooling Dock: the Fixture Frame is Positioned in the Dock. The Frame is Located with Reference to the Center Line of the Dock, Leveling by Adjusting the Frame - Locating Dollies, and Truing by Means of Adjustable Plumb Bars which are Situated on the Frame-Locating Dollies



the whole process of positioning jig or fixture locators became a glorified guessing game, for, despite the numerous instruments that were available, there was no universal method or device for finding three-dimensional locations. With the Tooling Dock, it is now possible to

observe machine shop tolerances in all positioning operations. If necessary, dimensional variations can be reduced to plus or minus 0.001 inch, and, thanks to the strip templates that are used for co-ordination, even this slight tolerance is not cumulative

When a jig or fixture locator has been accurately positioned in the Master Tooling Dock, it is fastened in a pot on the fixture frame. This is accomplished by pouring molten Cerromatrix—a low-temperature alloy—into the pot and allowing it to cool.

For ordinary positioning operations, only ten simple steps are required to utilize the Master Tooling

Dock. As shown in accompanying illustrations, these are:

- (1) A fixture frame is moved into the dock.
- (2) The fixture frame is positioned in the dock.
- (3) Ship stations are positioned, using strip templates.
- (4) The fixture location is tool proofed.
- (5) Vertical straight edges are moved to the first station.
- (6) Transverse straight edges are positioned on water-lines.
- (7) Dummy locators are mounted to the transverse straight edges on butt-lines.
- (8) A jig locator is positioned on



Straight Edge *b*; This Step is Repeated for Each Ship Station Location. (4) The Strip Template *a* is Removed and the Entire Operation is Repeated for the Remaining Three Longitudinal Straight Edges, Using the Same Strip Template

the dummy locator.

(9) The entire set-up is tool proofed.

(10) The jig locator is mated with the fixture frame.

The last six steps are repeated at each following station until the jig or fixture is complete. All these steps may be performed in rapid succession by semi-skilled workmen in the

course of a few hours. Previously, the same type of work necessitated days and weeks of effort on the part of veteran toolmakers.

Sometimes an "index template" may be used to position contour locators in the third dimension and to establish the relationship between

Fourth Operation: The Fixture Location is Fool-Proofed. This Operation is Accomplished by Checking the Location of the Fixture Frame with Reference to the Dock Center Line, and So On. Also, the Settings of Cerromatrix Pots on the Frame are Checked with Relation to Ship Station Positions on the Longitudinal Straight Edges of the Dock



Third Operation: The Ship Stations are Positioned. This is accomplished as follows: (1) The Strip Template *a* is Mounted on the Longitudinal Straight Edge *b*, Using Ground Dowel Pins *c* Through Both the Lower $\frac{1}{2}$ -inch Holes in the Template and in the Longitudinal Straight Edge. (2) A Dock Station Fitting is Positioned by Inserting Ground Dowel Pin *e* through the Margin Hole *f* of the Strip Template into the Dock Station Fitting Hole, and the Dowel Pin is Rotated in the Hole to Make Sure that it will neither Bind nor Have any Play. (3) A Dock Station Fitting *d* is Bolted Tight to the "T" Slot in the Longitudinal

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Fifth Operation: Vertical Straight Edges are Moved to the First Station. This is Accomplished as Follows: The Overhead Crane is Attached to Each Vertical Straight Edge by Bolting the Lifting Yoke e. (2) The Vertical Straight Edges are Guided to the Location of the First Ship Station. (3) Dock Station Fitting b is Positioned by Using a Ground Dowel Pin through Holes in Each Vertical Edge and the Dock Station Fitting. (4) The Straight Edges are Clamped Tight by Bolting to the Dock Station Fittings

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tooling holes in each part to be located in the assembly fixtures and the basic grid lines. The index template is made of $\frac{1}{8}$ -inch sheet steel of proper height and width as required for different fixtures in accord-

ance with lofting information on a master layout. Therefore it might be called a "metal layout" of the body plan, except for the fact that tooling holes are superimposed rather than contour lines.

By the Photoprint process, the master metal layout is reproduced on 1/16-inch steel template stock which can be used for further tooling purposes, and the result is known as the "master tooling layout." Individual reproductions of the master tooling layout are superimposed over pins inserted in coordinated holes

at grid intersections on an otherwise blank index template, and these are stack drilled at each of the tooling hole locations so as to transfer the exact locations of the tool holes to the index template.

Each index template has grid lines on 10.000-inch centers and coordinating holes reamed to 0.500-inch diameter. For this purpose, the master index drill bar is used at the intersection of the grid lines with the vertical center line of the airplane in the case of a fuselage, and on the wing reference plane in the case of airfoils. Corres-





Sixth Operation: Transverse Straight Edges are Positioned on Water-Lines. (1) A Water-Line Strip Template *a* is Attached to Vertical Straight Edge *b* by Means of Ground Dowel Pins *b-1* thru Jig-Bored Holes in Strip Template *a* and Vertical Straight Edge *b*. (2) Ground Dowel Pins are Inserted thru Margin Holes of Strip Template *a* and Transverse Straight edge *c* to Locate the Transverse Straight Edge at the First Water-Line. (3) The Transverse Straight Edge is Clamped Tight by Bolting. (4) Index Fittings *d* are Attached to Transverse Straight Edge *c*. Locating by Butt-Line Strip Template *e*. (5) All Steps are Repeated for Transverse Straight Edge *f*.

ponding index holes, drilled in the individual master tooling layouts (loft reproductions), provide a means of co-ordinating these with the master index template during the stock-drilling operations.

In the tooling dock, the index template is attached to fittings on the transverse straight edges. Thus it becomes possible to move from station to station, rapidly and successively establishing the tooling locations.

When reproduced, in the form of a master tooling layout, the master layout becomes the sole source of reference for making the index template,

Seventh Operation: Dummy Locators are Mounted to the Transverse Straight Edges on Butt-Lines. This is Accomplished on Transverse Straight Edge *b* by Inserting a Bolt in a "T" Slot on the Straight Edge so as to Attach Angle Block *a*. Enough Play is Allowed in Tightening the Bolt to Permit Lateral Movement Along the Transverse Straight Edge. The Operation is Repeated on the Upper Transverse Straight Edge, if That Member is Used



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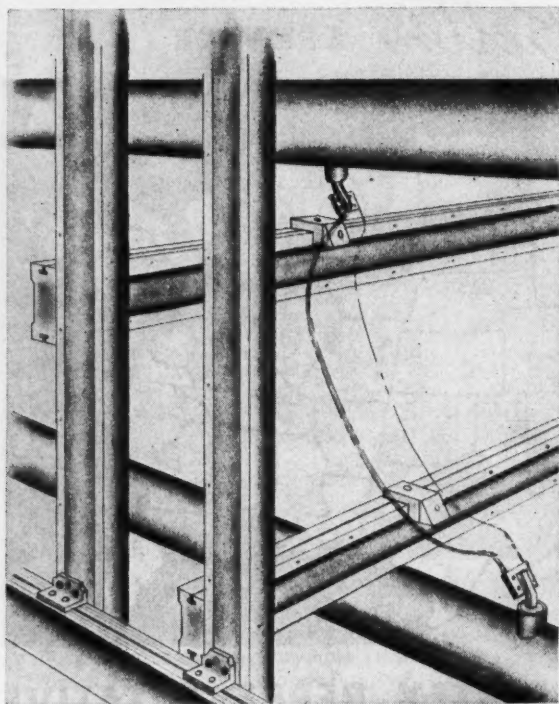
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Perflex manufactures thread plugs, thread rings, plain
plugs, plain rings and special thread gages to blueprints.

April, 1944

MODERN MACHINE SHOP 131



Eighth Operation: A Jig Locator is Positioned on the Drawing. In the Drawing Shown Here, the Jig Locator is Represented by Phantom Lines

crews working in Consolidated Vultee Aircraft Corporation's new Master Tooling Dock. The rough structures (jig fixtures frames), contour locators, machined parts, drill plates, and clamping devices are prepared by separate groups which specialize in such fabrications. The old scheme of assigning separate jigs to lead men has given way to modern manufacturing methods, and it is now possible to apply assembly-line techniques to the manufacture of tooling. Coordination of work

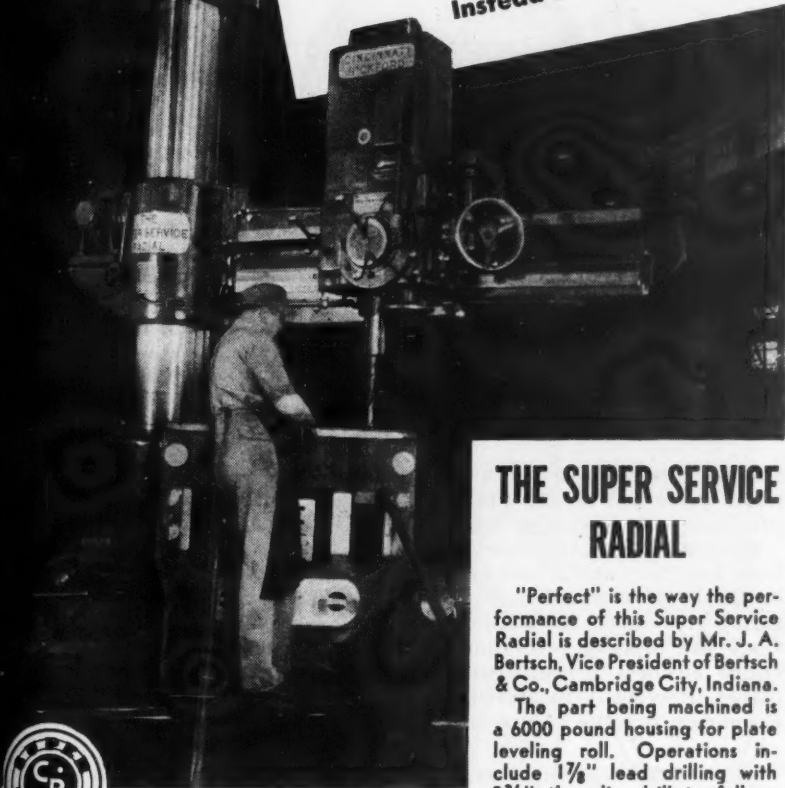
strip template, and other templates for the fabrication of parts. Therefore complete coordination of all tooling holes is attained, and it is unnecessary for workmen to refer to drawings in order to obtain the required dimensions.

Fixtures of every kind have been and are being successfully assembled by

Ninth Operation: The Entire Set-Up is Tool-Proofed. The Foremost Objective Here is to Check the Alignment of Holes with an Inspection Plug Gage. If the Set-Up has been Properly Made, the Inherent Accuracy of the Master Tooling Dock ensures Precision



**"6 HOURS ON OUR
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Instead of 9 hours previously



THE SUPER SERVICE RADIAL

"Perfect" is the way the performance of this Super Service Radial is described by Mr. J. A. Bertsch, Vice President of Bertsch & Co., Cambridge City, Indiana.

The part being machined is a 6000 pound housing for plate leveling roll. Operations include $1\frac{7}{8}$ " lead drilling with $3\frac{3}{8}$ " three-lip drill to follow;

holes are then reamed to $3\frac{1}{16}$ " to a limit of accuracy of $-0, +.002$ in. Four holes are reamed in this set up.

On machine previously used the floor-to-floor time required for this job was approximately 9 hours. Since the installation of this Super Service Radial, time has been cut to 6 hours with a saving of about 33% in cost.

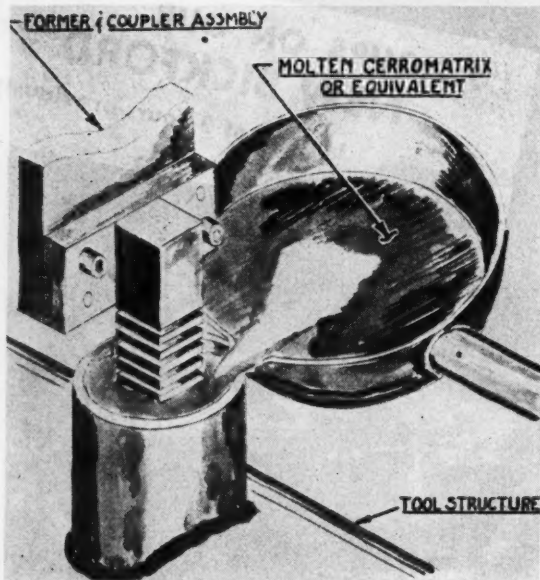
This machine is living up to the expectations of its owners who purchased it for its "accuracy and rigidity."

The reason why Super-Service Radials meet all requirements are described in Bulletin R-24, available promptly on request. Write for details today.



THE CINCINNATI BICKFORD TOOL CO.

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Tenth Operation: The Jig Locator is Mated with the Fixture Frame. This is Accomplished by Pouring Molten Cerromatrix or an Equivalent Low-Temperature Alloy, into a Suitable "Pot" of the Frame. When the Molten Material Cools and Hardens, the Jig Locator is Firmly Held in the Correct Position.

affected through a tool control group, which plans and assigns the work orders in accordance with a master plan.

By facilitating the fabrication of tools for the manufacture of aircraft on the basis of an efficient manufacturing breakdown, the Master Tooling Dock has literally revolutionized the entire business of constructing airplanes. Previously in aviation it was a common practice to use only a few

very large jigs or assembly fixtures in the construction of an individual airplane, because toolmakers found it easier and faster to fabricate a few large tools than to make a number of small tools. The number of workmen that could be placed on any one job was limited, due to the lack of working space and, due to the involved nature of the work, an air-

craft mechanic had to be a combination craftsman and contortionist. Now, with the Master Tooling Dock in operation it is possible to fabricate numerous small tools with maximum speed and efficiency. Therefore an airplane can be broken down into as many small parts as desired and assembled over a comparatively large work area by innumerable workmen with specialized skills.

(The second half of this article will be published in the September issue.)

"Rexalloy" Cutting Tools. To provide metal-working men with all essential facts and figures on "Rexalloy" to assist them in selecting efficient tools for "middle-range" machining applications, the Crucible Steel Company of America, 405 Lexington Ave., New York 17, N. Y., has prepared a 28-page catalog containing complete information on this non-ferrous cutting alloy. Copy is available to metal-working men addressing requests on their company letterheads.

Onsrud Nonferrous Metal-Working Machines. A 44-page pocket-size catalog presenting every nonferrous metal-working machine and tool manufactured by the Onsrud Machine Works, Inc., 3924 Palmer St., Chicago 47, Ill., is now being offered free by this firm. Machines and tools presented include automatic contour milling machines, routers, radio arm drills, shapers, electric motors, turbine motors, portable grinders, and so on.

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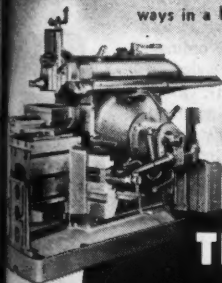
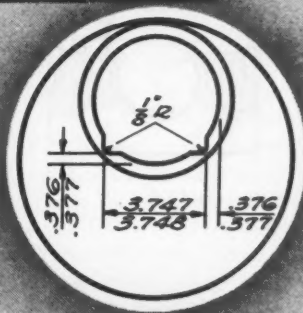
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In the field of internal shaping alone, Cincinnati Shapers are used on a long list of "hard to get at jobs"—from cutting internal key ways to cutting symmetrical and non-symmetrical holes.

We show a Cincinnati Shaper shaping internal key ways in a blind hole—a "hard to get at job." Remember, a Cincinnati Shaper, the tool of many uses, will always be busy in your shop.

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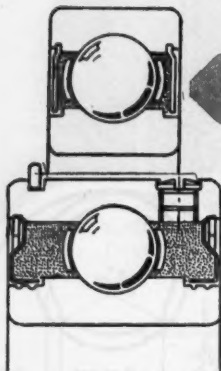
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In this single-row-width shielded or "sealed" bearing, see the very small available inside grease space. Note also that there's no room for an efficient, grease-tight seal.



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Moreover, the "CARTRIDGE" SEALS ARE REMOVABLE for bearing inspection or regreasing; and the refilling plug makes regreasing easy. The ordinary shielded or "sealed" bearing is permanently sealed.

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TO SUM UP—these distinctive features mean longer life, less lubrication attention, and lower maintenance costs. There are other important features, too. Write for the "CARTRIDGE" BEARING Catalog. Let our engineers work with you.

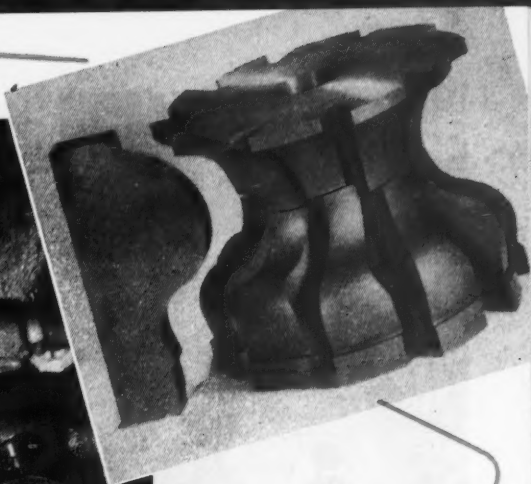
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DED 1937

August, 1940



Cold-finished steels possess high surface finish, accuracy as to size and section, straightness, and improved machinability. Such steels are ideal for screw machine production of items like those shown here.

Cold Finished Steels

Play Important Part In War

By J. D. ARMOUR
Chief Metallurgist, Union Drawn Steel
Division, Republic Steel Corporation

Machinability Vital Factor in Building The Arsenal of Democracy

WAR has focussed a brilliant floodlight on cold finished steel. Hundreds of parts used in the armaments of the world depend on cold finished steel for their almost perfect accuracy. The deadly precision of modern shells and bullets is due in part to cold finished steel. American industry, in getting ready for its mighty war production effort, relied greatly on cold finished steel bars for precision parts for precision machines.

All of these parts called for steel bars in a myriad of shapes and sizes and with certain definite qualities. It was necessary that the bars should possess high surface finish, accuracy as to size and cross section, straightness, high physical qualities and maximum machinability. Cold drawn steel bars were the perfect answer to all

these requirements. They were available in rounds, squares, flats and hexagons for use in the production of shafting and in screw machine stock. Manufacturers had available some 20,000 standard dies, with which bars could easily be produced in almost any desired special shape.

Cold finished bars may be divided broadly into three classes according to the method of processing—(a) turned and polished, (b) ground, and (c) cold drawn. The first two are generally considered for shafting and the third for stock for screw machine products. In this article consideration will be given to cold drawn steel and its applications to the screw machine industry.

As cold drawn steel is largely used for the manufacture of finished parts

... machine tools, particularly by automatic screw machines, the matter of producing steels that will be responsive to such operations and still retain good physical properties has received constant attention from the industry. Good machining qualities are inherent in some steels, due to their analysis or to steel making methods.

Improved machinability lengthens tool life, reduces tool grinding and tool changes, lowers the maintenance cost of machines, and minimizes their down-time. Further economies are effected by the absence of scale, for scale destroys tool life and causes vibrations that are exceedingly hard on equipment.

The automobile has become symbolic of the fruits of mass production; an achievement made possible through the largest possible use of machinery to replace the slower operations of hand labor. Fortunately, when the

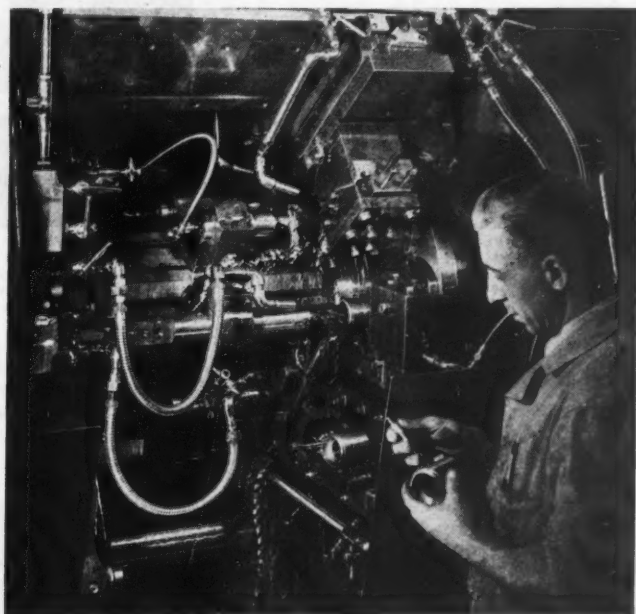
automobile first came into large demand, there was available for rapid production a remarkable tool that had been introduced and developed many years before. This was the automatic screw machine, the production value of which had been proved in the long — (a) manufacture of fount, and bicycle parts. The

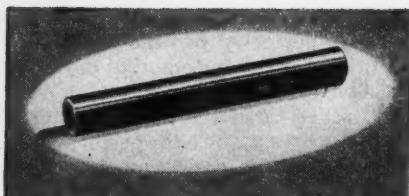
two are lifting and machine consideration of high machinability, the machined surface, and long tool life are just three of the advantages of cold-finished steels in screw machine stock.

speed and accuracy of this machine fitted it perfectly for the mass production of many automotive parts.

Efficient operation of any tool, however, relies upon the use of material particularly suited to its performance. Good automatic screw machine production requires steel bars that are smooth surfaced, straight, true to size and shape, and that offers the greatest machinability consistent with other desired properties. Only cold finished steel bars possess these requirements. Cold drawn steel is a highly specialized material, primarily manufactured to develop the greatest efficiency in machine tool production. Steel in no other form offers comparable qualities for that purpose.

It has been said that cold drawing takes the "first cut" on steel bars, and every experienced machine tool operator realizes the full meaning of this phrase. It indicates that cold drawing accomplishes results similar





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Small, accurately machined pieces, like this airplane-engine part, turned out by Ace, have given this country of ours the overwhelming striking-power to restore peace. Starting from solid bar-stock, it is rough-machined, carburized on the outside, drilled, then hardened and ground.

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to that which would be obtained by actually machining the bar. There is a great distinction, however, in method. Cold drawing does not remove the surface metal from the hot rolled steel. The metal, after removal of all scale, is made to flow cold through a die which reduces its cross section. The waste of metal common to machining is eliminated.

It must be emphasized that the ac



Carefully-controlled centerless grinding helps produce the mirror-like surface finish, accurate size, and high degree of concentricity of the Republic Union Drawn cold-finished shafting.

accuracy attained by cold drawing within very close tolerances. This feature, as well as good surface condition, is equivalent to the results produced by careful machining. Thus savings in machining operations are large, even with a limited use of cold drawn steel.

With regard to analysis; sulphur contributes more to good machinability than any other element. It con

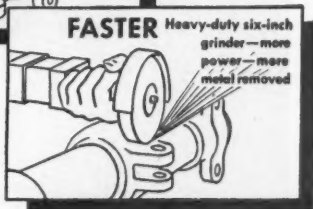
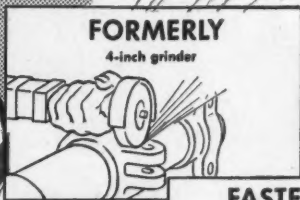
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HOW WE UPPED THEIR OUTPUT

9 Struts per Man-Day

This forge shop was hogging and cleaning right-angle struts (steel forgings) for bomber landing gears—using the 4-inch Air grinders they had for their standard products.

When called in for an unbiased analysis, the Rotor Application Engineer discovered the weakness and recommended the *right tools* for the job—heavy-duty 6-inch Air grinders which, because of greater power under load, remove the metal faster. The switch was made and production “took off” to these levels:

1. Increased output 9 struts per man-day.
2. Cut cleaning cost 20%.
3. Increased grinding wheel life 10%.

Aren't *you* looking for results like these? Maybe the Rotor Application Engineer can help you find them!

Yours for the *right tool*.

AIR O'TOOL

THE **ROTOR TOOL**

HIGH
CYCLE

UNBIASED ANALYSIS OF PORTABLE TOOL PROBLEMS



At the Union Draw Steel Division of the Republic Steel Corporation, bright, cold drawn bars are critically inspected over their entire length for surface defects and quality of surface finish.

general it may be said that, all other things being equal, the lower the tensile strength and ductility the better the machining properties. Or, if the structure is the factor to be considered, machinability is better

in steels which combine with manganese to form microscopic particles of manganese sulphide which are scattered through the steel. The manganese sulphide causes the chips to break readily, and results in a smooth finish with a minimum of power consumption and heat generation.

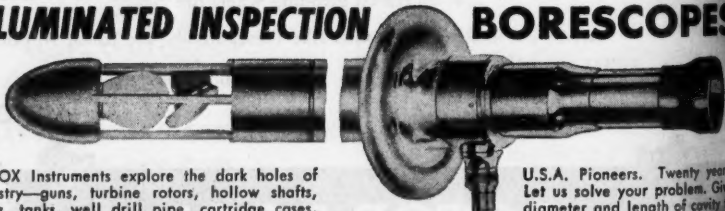
The characteristics of steel which have the most pronounced effect on machining properties are tensile strength, ductility and structure. In

a steel of a coarser grain. The presence of some constituent to break up the continuity of the ferrite (principal crystal element of steel) will also improve machinability, provided it is not of an abrasive nature. A typical example is the influence of manganese sulphide in high sulphur steel.

Carbon can also be considered as an aid to machining properties, in so far as it helps to reduce the ductility of the steel. It is, however, considered

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permits heavy cuts at high speed . . . saves tools and time

When there's a lot of metal to be removed . . . in a hurry . . . that's a job for Sunoco Emulsifying Cutting Oil.

Take the operation shown below, for instance. The material was tough — S.A.E. 1045 steel; the cut was deep — $\frac{3}{8}$ " ; and the speed was fast — 270 R.P.M. But with the help of Sunoco the job was done successfully . . . meeting every requirement of speed, finish and tolerance.

This operation is only one of thousands of difficult and exacting cutting jobs that every day are made easier by the use of Sunoco Emulsifying Cutting Oil. The exceptional heat-absorbing and lubricating character-

istics of Sunoco recommend it universally in shops where speed of production, fine finish, nth degree limits of tolerance, and tool economy are musts.

Probably in your shop, too, there are operations that could be improved and speeded up with Sunoco. Sun Engineers are at your service to help you with your machining problems . . . and prove to you under your own operating conditions the advantages of Sunoco. Contact your nearest Sun Oil Company office today, or write direct to . . .

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Sponsors of the Sunoco News Voice of the Air—Lowell Thomas

PERFORMANCE DATA
OPERATION — Turning 5" diameter at 350 S.F.P.M.
MACHINE — 18" x 54" American Pacemaker Lathe.
MATERIAL — S.A.E. 1045 steel. FEED — .022".
SPINDLE SPEED — 270 R.P.M. DEPTH OF CUT — $\frac{3}{8}$ inch.
CUTTING LUBRICANT — 1 part Sunoco to 20 parts water.

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SERVE**

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HELPING INDUSTRY HELP AMERICA

twenty years.
problem. Give
of cavity to

OR 31.
3, Pa.

August, 1941

better to reduce steel ductility by adding manganese or phosphorous rather than carbon.

Whether or not the chemical composition of any steel produces a combination of tensile strength, ductility and structure favorable to good machinability, that property can be greatly improved by processes designed to alter those characteristics.

One of the simplest and least expensive methods is cold drawing. The marked improvement resulting from this process is due principally to its effect on the ductility.

But how is cold drawn steel produced? At the Union Drawn Steel Division of the Republic Steel Corporation bars to be cold drawn are received from the hot rolling mills in lengths of 30 to 40 feet, the length having been figured to produce multiples of the finished lengths after drawing, or in coils in the case of small sizes. Owing to the effects of cold

working on steel, and in order to meet physical specifications or provide improved machinability, it is sometimes necessary to anneal the bars before drawing.

Before cold drawing, bars are pickled to remove the scale which results from hot rolling or annealing. Sulphuric acid is the usual pickling of stainless steels. Agitation is essential in the process, and a unique system is employed which not only keeps the solution in constant motion, but also provides a mechanical movement of the bars which tends to break up the scale.

After pickling, the bars are thoroughly washed with a high pressure water spray and immersed in hot lime water to neutralize any acid which might remain. The entire surface is then covered with a thin coating of lime, which acts as a rust inhibitive and as a lubricant for the drawing operation.



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FORMULA FOR GOOD WORK

"How do you mix your paints?" inquired an admirer of the colorful work of a famous painter. "With brains," was the artist's crisp reply.

The combination of "know how" and good tools is an equally effective formula in the industrial sense. The machinist below, assigned to an exacting job in a vital war plant, offers an example. Armed with Nicholson Files and his years of experience, his production is high, his work precise, his rejects few.

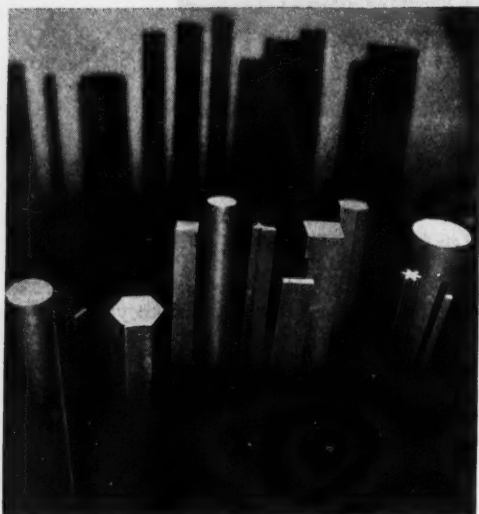
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Nicholson Files are designed toward the ultimate aim of every manufacturing management: *maximum production of a satisfactory product with minimum waste.* Precision-shaped, precision-cut, precision-hardened, these world-famous files come to you in such uniformly high quality that we can safely guarantee you *Twelve perfect files in every dozen.*

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Rounds, flats, hexagons and squares form a major part of the cold-finished steel shapes produced by the Union Drawn Steel Division of the Republic Steel Corporation.

The drawing operation starts with the "draw bench." This consists essentially of a holder for the dies, a draw head or "buggy" equipped with jaws to grip the bars, and a projecting hook which engages a long endless sprocket chain that furnishes that power for pulling the bars through the dies. Lubrication is very important to the drawing operation, and equipment is provided to deliver a constant stream of filtered oil to the bars just before they enter the dies. This assures perfect lubrication, better finish, and longer die life.

Dies are the most important fac-

tors in determining the accuracy of cold drawn bars. They are made of special die steels, and the opening through which the bars pass is bell-shaped in cross section. When it is considered that there are in excess of 20,000 standard sizes of rounds, hexagons, squares and flats shown in the manufacturers' extra lists, some idea may be gained of the die equipment of a modern cold drawing mill such as those of Republic's Union Drawn Steel Division.

The bars go directly from the bench to the straightening machine. Rounds are straightened by rotating them at high speed between staggered sets of concave rolls, the opposing rolls being set at different angles. Other shapes are straightened by a series of plane rolls spaced and adjusted to deliver pressure to all faces. These processes are a far cry from the original method of hanging the drawn shapes from the ceiling of the mill, with the fervent hope that gravity would do the rest.

Straightened bars are cut to length on a special type of cutter called a

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LINE A SHOT IN THE ARM
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WITH THE ENGINEERED RECESS
THAT SPEEDS UP ASSEMBLY AS

MUCH AS
50%
IT'S PHILLIPS



THE ENGINEERED RECESS

Manufacturers in every industry can tell you that switching to Phillips Recessed Head Screws acts like a tonic to assembly lines.

To start with, you get faster—much faster—screw driving. Comparisons made in scores of plants prove that Phillips Screws step up turning speed as much as 50%.

Next, Phillips Recessed Head Screws save precious man hours. The scientifically Engineered Recess utilizes the worker's full turning power and skill. Time and muscle are not wasted on wobbly turns, slantwise drives and dangerous driver skids—nor on correcting sloppy work.

Finally, with all this increased speed, you get vastly better workmanship. Phillips Recessed Head Screws make driving so simple, so steady that the most inexperienced operator soon becomes master of the trickiest fastening job!

If these are the kind of results you'd like, but aren't getting from slotted and other type screws, you owe it to yourself and to your workers to switch to Phillips—the screws with the *Scientifically Engineered Recess*. They cost less to use... because they help you produce much more. Any one of the 23 manufacturers below will enable you to prove it in your own plant.



PHILLIPS *Recessed Head* **SCREWS**

FLAT HEADS MACHINE SCREWS SELF TAPPING SCREWS STOVE BOLTS

23 SOURCES

American Screw Co., Providence, R. I.
The Bristol Co., Waterbury, Conn.
Central Screw Co., Chicago, Ill.
Chasolier Products Corp., Cleveland, Ohio
Continental Screw Co., New Bedford, Mass.
The Corbin Screw Corp., New Britain, Conn.
General Screw Mfg. Co., Chicago, Ill.
The H. B. Harper Co., Chicago, Ill.

International Screw Co., Darby, Mich.
The London & Western Co., Cleveland, Ohio
Machinewarrior Screw Products, Chicago, Ill.
Milford Brass and Machine Co., Milford, Conn.
The National Screw & Mfg. Co., Cleveland, Ohio
New England Screw Co., Kewanee, Ill.
Parker-Kalon Corp., New York, N. Y.
Pentacool Screw Co., Poughkeepsie, N. Y.

Piccol Manufacturing Co., Chicago, Ill.
Revolving Screw Co., Harrisburg, Pa.
Russell Burdick & Ward Bldg. Nut Co., Fort Clinton, N. Y.
Sawell Manufacturing Co., Waterville, Conn.
Shonopref Inc., Chicago, Ill.
The Southwestern Hardware Mfg. Co., Southfield, Conn.
Wolverine Bolt Co., Detroit, Mich.

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Center corner of Phillips Recess are rounded... NOT square.

Faster Starting: Driver points automatically centers in the Phillips Recess... fits snugly. Fumbling, wobbly starts, slant driving are eliminated. Work is made trouble-proof for green hands.

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Better Driving: Turning power is fully utilized. Workers maintain speed without tiring.



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Bottom of Phillips Recess is nearly flat... NOT tapered to a sharp point.

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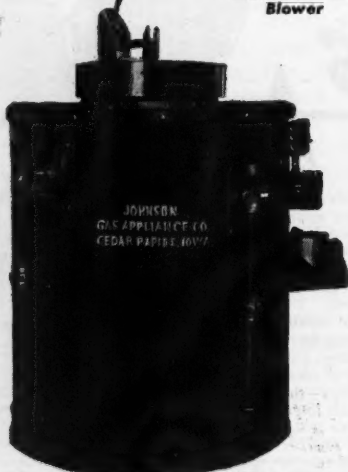
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"cracker." Bars which are too large in cross section for the cracking are cut by saws, lathes, or abrasive cutting wheels.

The cold-drawing process imparts to a bar a bright, smooth surface, consistently free of imperfections. So far as accuracy is concerned, size can be controlled to the point where smaller rounds may be exact to 0.002 of an inch under specified size. A 20-foot bar can be held within a straightness of 0.005 inch. Hexagons, squares and flats are very accurate to cross section and are characterized by parallel, flat sides, sharp corners and accurate angles.

All grades of steel react similarly to cold drawing, although it should be noted that the results bear a definite relation to the carbon content of the steel, the increase in physical requirements for a given draft decreasing as the carbon content increases. By varying the amount of draft within practical limits, a wide range of physical properties can be produced in steel of any given chemical composition.

Perhaps no cold drawn bar shapes find more varied applications than squares and flats—a fact which is evident from their extensive size range. It would be difficult to name an industry which does not find frequent needs for cold drawn rectangular bars for one purpose or another. Such bars are quickly cut to exact lengths to suit any requirements where accurate-size, square edged, smooth finished and flat surfaced bars are desired.

There are, of course, certain distinct applications in which appreciable tonnages are absorbed. Among these are machine racks, machine keys, structural parts of machinery, screw driver stock, printers' chases, side links in chain for elevating, conveying and power transmission, ele-

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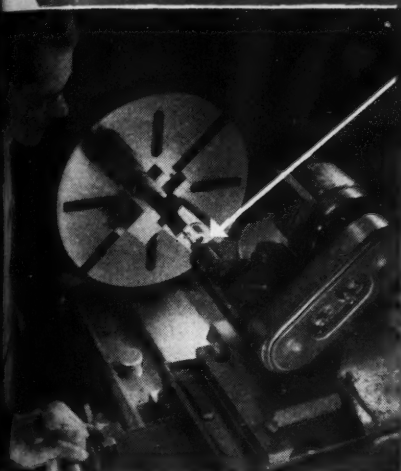
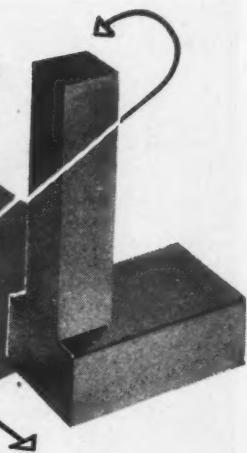
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ON SMALL DIAMETER INTERNAL GRINDING

Precision on small diameter grinding calls for high wheel speed—that's why you will find tool and die shops relying more and more on Dumore Precision Grinders for particular jobs like this fuse pin gage. The hole, $1\frac{1}{2}$ inches deep, is given a mirror

finish, with a tolerance of $\pm .0001$ in., an easy operation with the Dumore, running at a speed of 40,000 r. p. m. . . . High speed is not the whole story, however. The Dumore Quill is a marvel of precision manufacturing itself, as it must needs be to give smooth vibrationless operation at speeds up to 42,500 r.p.m. Its ability to operate with undiminished precision, for long periods has led to many applications on volume production of the highest quality. Ask your distributor for suggestions on wider use of your Dumore Precision Grinder, or write direct to The Dumore Company, Tool Division, Dept. TH33, Racine, Wis.

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DUMORE

**PRECISION AND
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Regular checking of measurements with a micrometer at Union Drawn Steel assures uniformity as to size in the cold-finished round bars.

purpose because their uniformity in size and section also assures uniformity in weight, essential to perfect balance of the shaft.

In recent years there has been considerable increase in the use of extra wide flats. They econo-

mically replace castings for such application as bed plates in lathes, planers and other machine tools. Their straight sides and sharp edges permit the use of wide bars in multiples to form flat surfaces of any desired width, thus eliminating the necessity of performing machining operations on castings for that purpose. Other applications for these wide bars are as die backing and stripper plates in the manufacture of dies, also for pattern plates and equipment parts. They are replacing hot rolled plates in the rubber molding industry.

vator door closers, jigs, fixtures and various mechanical parts manufactured from squares on automatic screw machines, such as bolts, door handle stems, and the like.

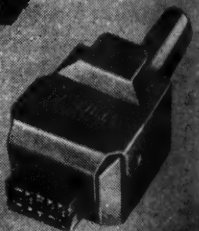
Squares and flats are used in the manufacture of business machines of all types, voting machines, automobiles, package machines and machinery used in the printing, textile, cigarette making industries, and so on. An interesting application of flats is for counterweights in automotive crank-shafts. Cold drawn flats are particularly suitable for this

mically replace castings for such application as bed plates in lathes, planers and other machine tools. Their straight sides and sharp edges permit the use of wide bars in multiples to form flat surfaces of any desired width, thus eliminating the necessity of performing machining operations on castings for that purpose. Other applications for these wide bars are as die backing and stripper plates in the manufacture of dies, also for pattern plates and equipment parts. They are replacing hot rolled plates in the rubber molding industry.

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Literature describing the complete ACROMARK line of marking, numbering and stamping equipment and accessories, is available on request.

The ACROMARK two-line holder is probably the most durable unit available today. Holding either type or logotype, dies are quickly removed or interchanged by mere pressure of the thumb. Oversize construction and heavy shoulder type give extra strength. Holder illustrated takes two lines of $\frac{1}{4}$ " type.



THE ACROMARK COMPANY

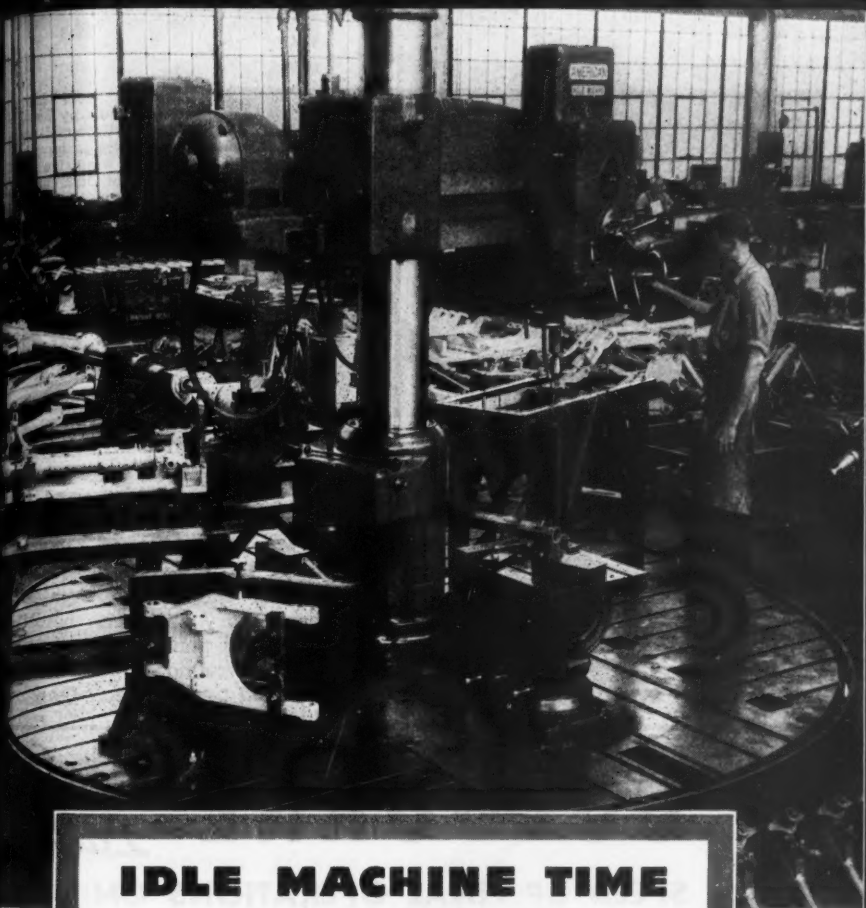
4 MADISON STREET

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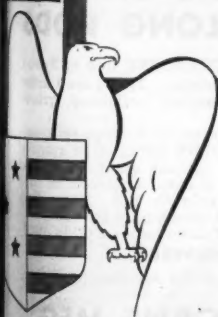
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IDLE MACHINE TIME ELIMINATED



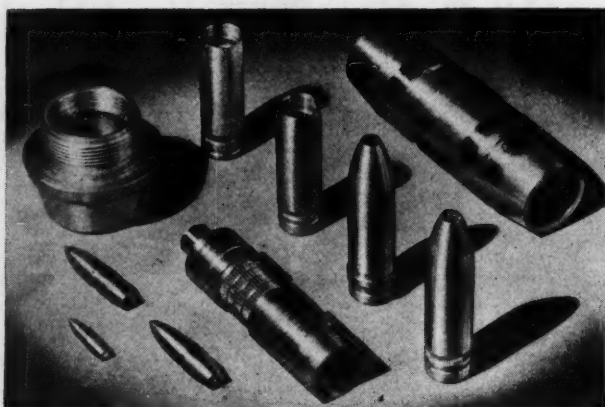
As the illustration shows, this "American" Hole Wizard Radial Drill is equipped with a circular base. This base permits multiple work set-ups for successive operations, thus completely eliminating idle machine time resulting from changing from one work set-up to another.

This is one plant's contribution to solving the man power shortage. By keeping its machines in constant operation, it reduces man power requirements to an absolute minimum.

"American" Hole Wizard Radials are meeting the demands of such continuous service.

THE AMERICAN TOOL WORKS CO. CINCINNATI, U.S.A.

Lathes and Radial Drills



Tons of cold-finished steels made by Republic Steel's Union Drawn Steel Division have gone into the precision manufacture of ammunition of various sizes and styles, such as those shown here.

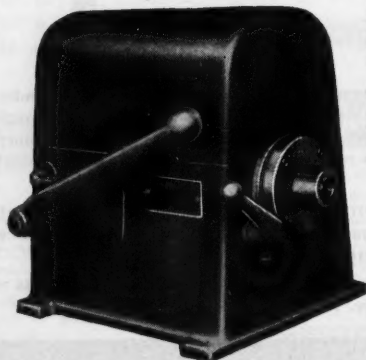
Parts in a wide variety of designs can be made from cold drawn bars of special section, saving the expense of castings, forgings, or of machining the parts from bars of regular shape.

Entirely aside from the advantages of surface and structure, relatively small lots of such sections can be

produced much more economically by cold drawing than by any other means, as it costs far less to make the necessary dies and mount them on a draw bench than to turn a set of rolls and mount them in a mill. Of course, the unit cost decreases as the size of the order increases, as the preparatory costs can be spread over a larger poundage or tonnage. Ordinarily, a round or flat bar would be hot rolled to a shape roughly sim-

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RFC HAND-CUT ROTARY FILES are used for surface roughing as well as for smoothing. Just an example of the hundred-and-one industrial applications for these men-of-all-work precision tools ... in rough forming, cleaning, shaping ... all manner of stock removal and finishing operations.

Speed and accuracy distinguish the performance of every RFC rotary file. RFC types, in high speed steel or high carbon steel, are heat-treated to suit the hardness of work ... shaped to fit or form any contour, recess, corner, groove or fillet ... sized, finished and fitted to meet almost any requirement. Files with a pedigree—of some 20 years of pioneering in this highly specialized field of manufacture!



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ilar to the desired cross-section in a small hand mill, and then reduced to exact size and shape in from one to five or six dies, depending on the complexity of the design.

To sum up, then; with the general use of high-speed automatic screw machines, no other material which can be produced economically in large quantities so fully meets the requirements of mass production by these methods as cold finished steel.

Farrel Manger Couplings. Farrel-Birmingham Co., Inc., Ansonia, Conn., has released an eight-page bulletin on Farrel Manger Couplings. Designated as the No. 446, the bulletin includes engineering details, application diagrams, and tables of sizes, ratings and dimensions of these couplings which are designed for applications where space limitations make a close-coupled connection necessary or desirable. Copy free upon request.

"Tool Steel for the Non-Metallurgist" is the title of a 32-page booklet now being offered by the Crucible Steel Company of America, 405 Lexington Ave., New York, N. Y. The booklet consists of a series of articles explaining the characteristics of the different types of tool steels, outlining the purposes for which each is best adapted, and giving suggestions for heat treatment. Copy free upon request.

"Jewels of Industry," an eight-page folder released by Continental Machines, Inc., 1306 S. Washington Ave., Minneapolis 4, Minn., points to the significance of Eli Whitney's dream of interchangeability and his important contribution to industry which has developed today's system of mass production. Modern industry's dependence on gage blocks is shown by application views taken from the company's film "Precision Measurements in Industry." Training aids offered by the company in the use and care of gages and gaging instruments are also briefly treated in the folder, copy of which is available free upon request.

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ACCURATE!**

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This late model, cabinet-type Rogers Grinder grinds knives so they cut more keenly and last longer. Grinds on edge or face . . . any bevel . . . edge up or down . . . flat or concave. No skilled operator needed. Send for Circular N T; give length of knives.

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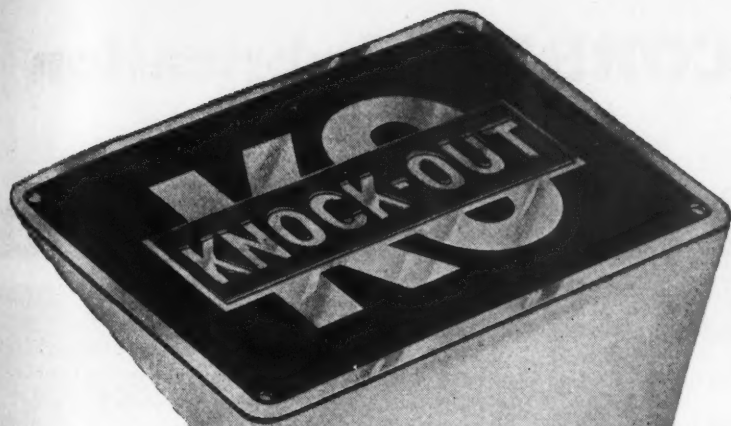
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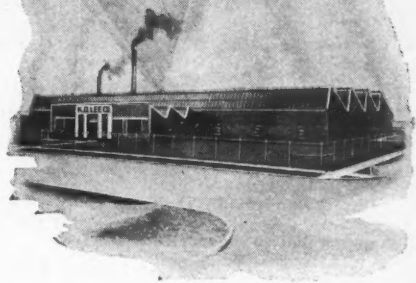


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- UNIVERSAL TOOL GRINDERS
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Literature on any or all products
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MODERN MACHINE SHOP 157

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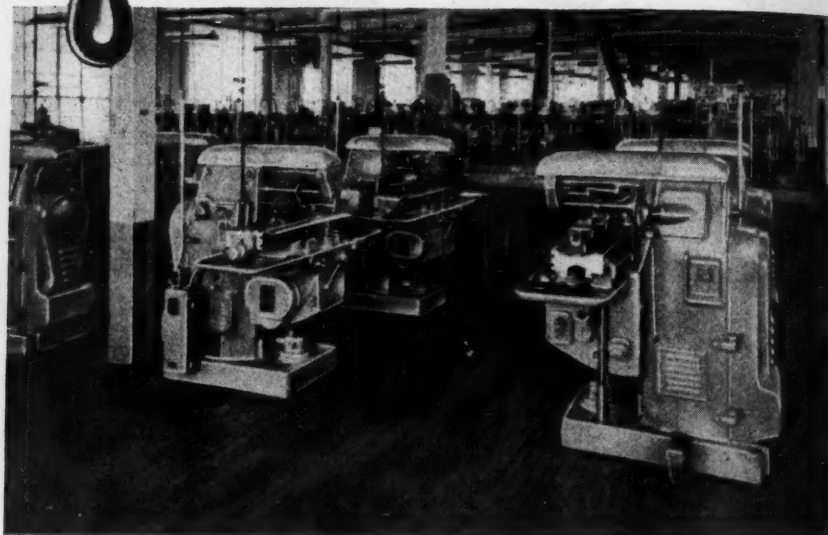
August, 1944

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CORRECT Lubrication means

Better Maintenance



PROBLEM—excessive wear, difficult maintenance.

SOLUTION—*Correct lubrication.*

Sinclair provides a range of specialized oils and greases for *correct lubrication of MACHINING EQUIPMENT*

Sinclair General Purpose Oils permit a reduced inventory of highly efficient lubricants for automatics, turret lathes, broachers,

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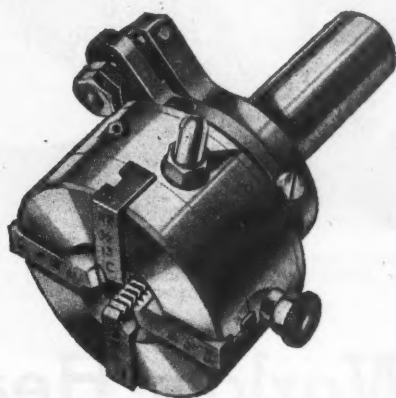
(Write for "The Service Factor"—published periodically and devoted to the solution of lubricating problems.)

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FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE SINCLAIR REFINING COMPANY, 630 FIFTH AVENUE, NEW YORK 20, N.Y.

GEOMETRIC STYLE DS DIE HEAD

**Self-Opening
Convertible for
Hand Machines**



**Pull-Off Trip
Outside Trip**

Primarily for use on Brown & Sharpe Automatic Screw Machines, Wire Feed Machines, also other light hand screw machines and automatics.

NOW can be quickly converted for use on a hand machine without purchase of additional parts. Comes equipped with closing pin which can be removed and closing handle inserted. Closing pin and closing handle furnished as standard with both these heads.

We'll be pleased to send our catalogue giving details.

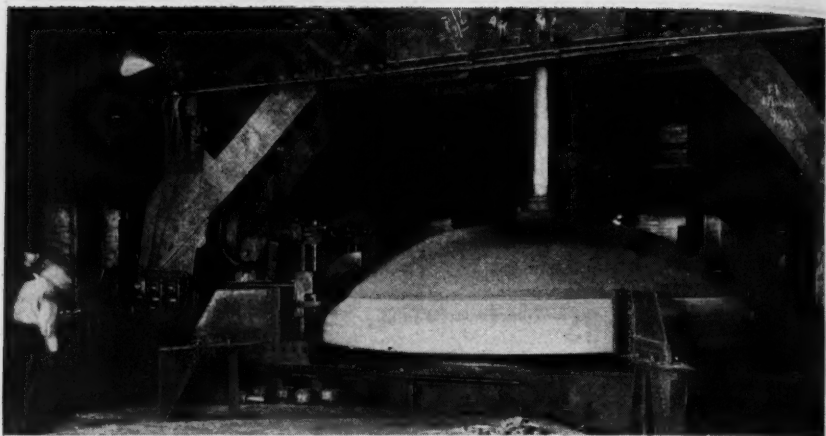
Geometric also makes:

- Self-Opening Die Heads
(other styles)
- Solid-Adjustable Die Heads
and Taps
- Collapsing Taps
- Threading Machines
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The Geometric Tool Company

New Haven 15, Conn.



Spinning one of the four heads in the plant of Lukens Steel Company for M. W. Kellogg Company, Jersey City, N. J., for use in fabrication of petroleum reactors. This illustration shows one of the heads at the completion of the spinning operation.

World's Heaviest Spun Heads

**Weighing 34,370 Pounds Each,
Made by Lukens Flanging
Department**

By BARTLETT WEST

FOUR elliptical dished heads each weighing 34,370 pounds—the heaviest heads of any type ever spun—were formed recently by the Flanging Department of Lukens Steel Company, Coatesville, Pa., for use in the construction of petroleum reactors that had been designed and were to be built by The M. W. Kellogg Company, Jersey City, New Jersey.

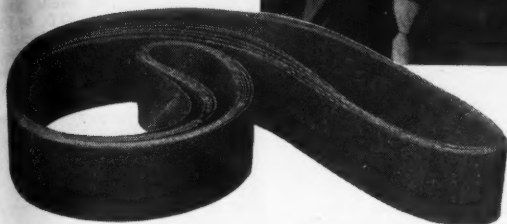
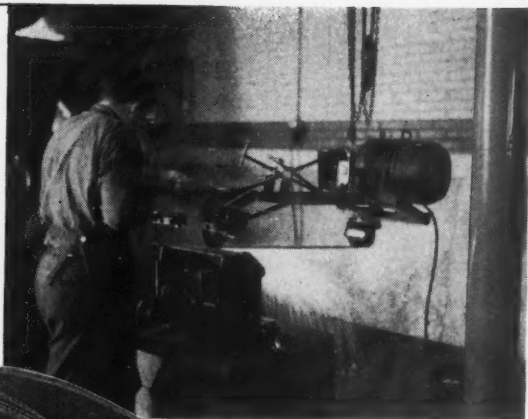
Each head was spun from a flat

disc $2\frac{1}{2}$ in. thick and 230 in. in diameter. Since a width of 230 in. is beyond the capacity of even the Lukens 206-in. mill—which is the world's largest plate mill—the disc could only be made by welding two plates together. Accordingly, eight plates were rolled, each 116 in. wide, 232 in. long, and $2\frac{1}{2}$ in. thick. The plates were shipped to the M. W. Kellogg plant at Jersey City where they were

NORTON ABRASIVES

Here you see the seam weld on a steel housing being both rough-ground and finished in the same fast belt operation.

None the shower of sparks! Yet the belt disperses heat quickly.



METALITE CLOTH BELTS

Improve Swing Frame Grinding!

NATURALLY! Their greater area and sharper surface obviously provide cooler, faster cutting and better finish.

A maker of stainless steel tanks for milk trucks, where finish was paramount, was influenced by one of our men to adopt this modern method for polishing the entire inside of the huge saucer-shaped end—a tough proposition.

Result: One man, one shift, now keeps ahead of a schedule that formerly required two men, two shifts.

If you run a Swing Frame Belt Grinder, send for our brochure "Metalite Cloth Belts Improve Swing Frame Grinding."

If not, we can send you manufacturer's literature on the Grinder itself. Here's a handy coupon.



BEHR-MANNING • TROY, N. Y.

(DIVISION OF NORTON COMPANY)

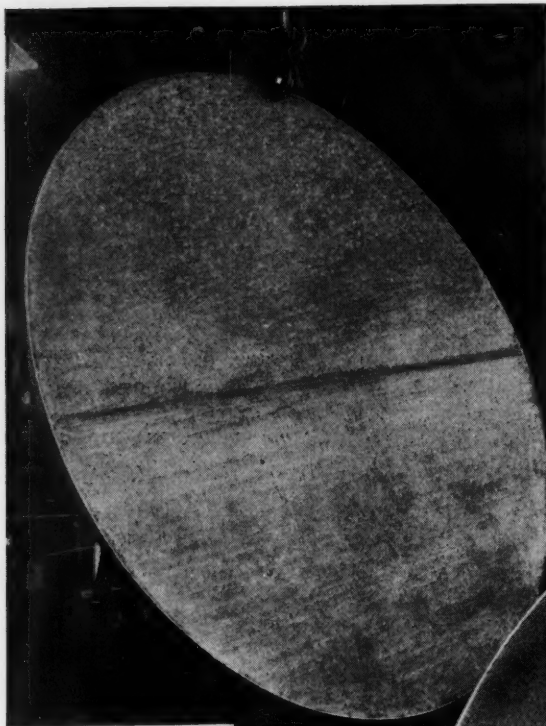
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..... **Metalite Cloth Belts, etc.** **The Swing Frame Abrasive Belt Grinder**

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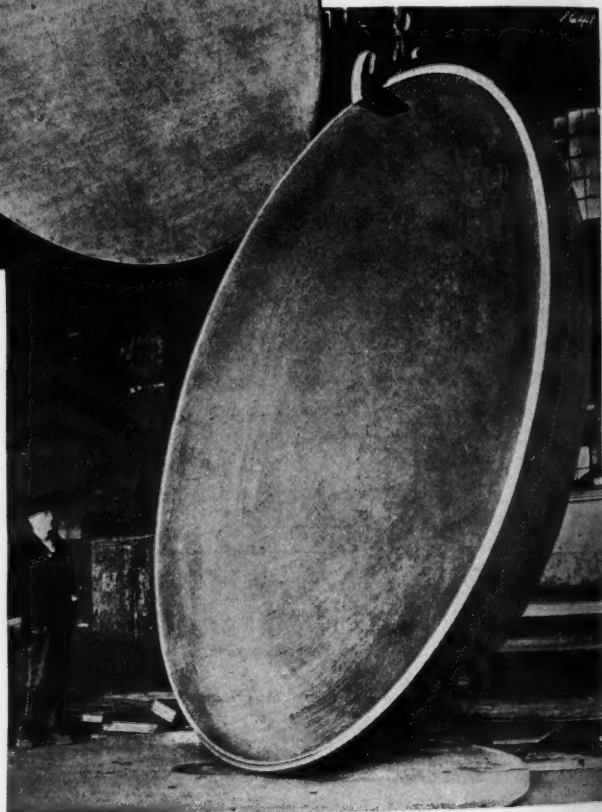
(Above) — Flat steel circle 230 in. in diameter and $2\frac{3}{4}$ in. thick before spinning to form a petroleum reactor head.

paired and welded into 232 in. squares. The welding was done in accordance with Paragraph W-451 of A. P. I.—A. S. M. E. Code for Unfired Vessels for petroleum liquids and gases. From each of these four squares, a flat disc (known

in mill parlance as "circles") 230 inches in diameter was flame-cut.

The four huge flat discs were then shipped to the Lukens plant at Coatesville. Because of their great size, it was necessary to cut away part of the railroad car to lower the

(Below)—One of the four Lukens elliptical dished heads, measuring 15 ft. 2 in. O.D. by 47 1/4 in. over-all depth as formed to shape by spinning in the Flanging Department of Lukens Steel Company.



HARDINGE



Style "B"

Master Feed Fingers
and Replaceable Pads

Save Material

The illustrations graphically show the material saved when a HARDINGE Style "B" Master Feed Finger and interchangeable Pads are used instead of conventional solid feed fingers.

Although this saving has been going on in screw machine departments using Style "B" since 1929, it is now more important than ever before as the economy not only saves money for you, but also conserves steel which is of vital importance today.

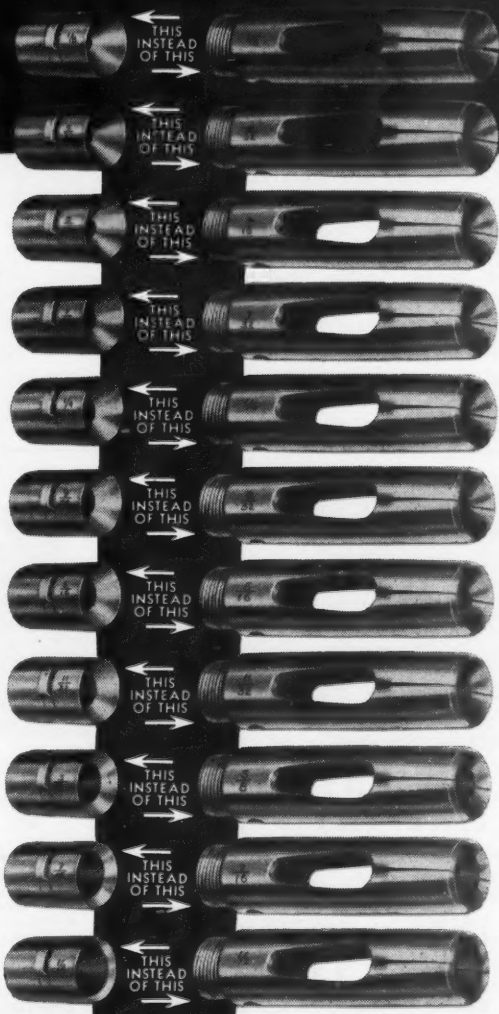
This saving is apparent to you. The many other advantages of using HARDINGE Style "B" Master Feed Fingers with either steel, brass or nickel cast iron pads will be immediately appreciated when you put them into use. Learn these advantages by asking for your copy of the bulletin illustrated below.

ASK FOR THIS BULLETIN

Every screw machine department should have the complete information given in this bulletin. Available to purchasing agents, superintendents, foremen, engineers, set-up men and operators in organizations which have a screw machine department.



HARDINGE BROTHERS, Inc.
ELMIRA, N. Y.



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circular plates in them sufficiently to clear overhead obstructions. Subsequently, plates for similar heads were welded together at Lukens to obviate these transportation difficulties.

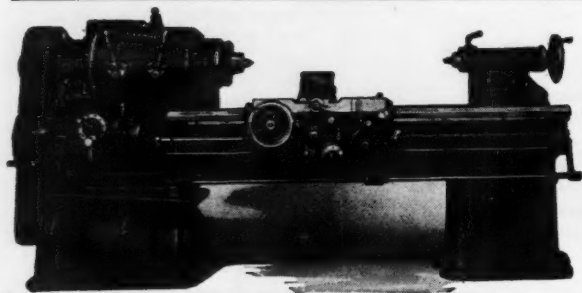
The furnace in which the discs were heated prior to spinning is of brick construction, 18 ft. square inside, gas fired with natural gas. However, to handle the heating of these circular plates for the first forming operation, the furnace was enlarged by the building of a semi-circular extension.

Five heating operations were required before the final spinning operation was completed on each head. The first heating took approximately eight hours, and as soon as the plate was heated to the required temperature for working, it was transferred from the furnace to the spinning machine by the use of an overhead crane and a special handling device which is called a "peel." The plate was formed as far as possible before it

cooled to a temperature above the critical range of the steel then was transferred back to the furnace and reheated. Great care is always taken to insure that the head is formed only when the temperature of the steel is well above its critical range. This process of uniform heating and hot spinning minimizes the development of residual strains that are common in heads formed by local heating and sectional flanging.

In forming standard grades of carbon steel heads the discs are heated to approximately 1800 degrees to 2000 degrees F. Approximately this same temperature range applies when spinning heads of such ferrous or non-ferrous metals or alloys as stainless steel, nickel, Inconel or Monel while such metals as aluminum, brass and copper are spun at much lower temperatures.

After the plate had been thoroughly heated in the first heating opera-



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RICHMOND.....D. A. Parker
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ST. LOUIS.....Pratt & Whitney Co.
SEATTLE.....Buckner-Weatherby Co., Inc.
TOLEDO.....Frank D. Lake Co.

Canadian Representative: Moore Bros. Mach'y Co., Ltd., Montreal

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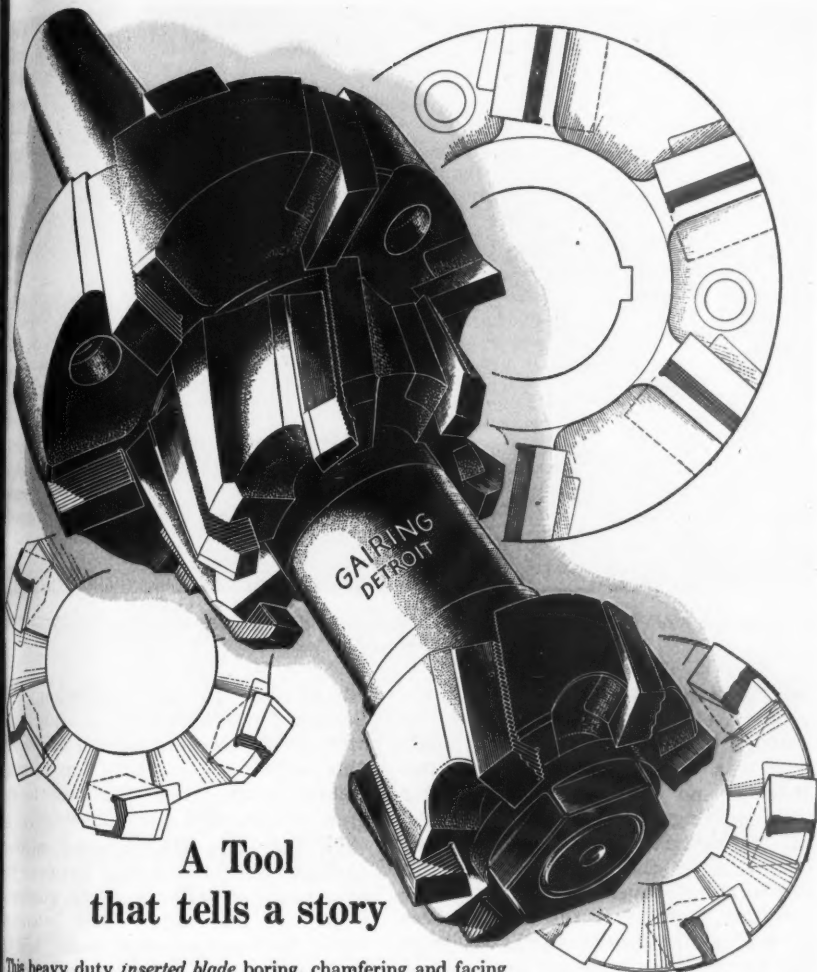
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August, 1944



A Tool that tells a story

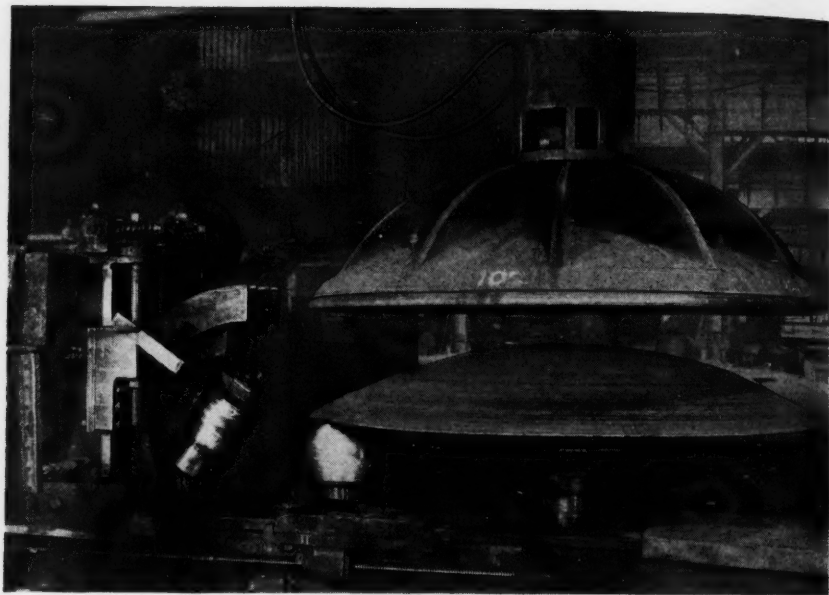
This heavy duty *inserted blade* boring, chamfering and facing tool was designed and custom built to solve a specific, high production metal cutting problem. Rugged simplicity and interchangeable cutter heads and blades are combined.

It is used here as a symbol because it is typical of the work Gairing engineers and craftsmen are doing in the design and precision manufacture of inserted blade cutters.

More than a quarter century of specialized experience in creating tools of this character has naturally taught us the particular advantages of all types of Gairing inserted blades and locks. We use all of them: the type best suited for the need.

Should you have a production job requiring the use of Inserted Blade Cutters, we'd like to discuss the matter with you • The Gairing Tool Company, Detroit 32, Michigan—Manufacturers of standard, special and Gair-Lock inserted blade cutting tools.

GAIRING



Lukens large spinning machine with formers in place but with no work in machine, showing construction of machine.

tion, subsequent heatings took approximately three hours each. The amount of work done between heatings was variable, however, because there is no set rate of speed for the spinning operation. The speed of the operation depends upon the condition of the blank, whether or not a blank develops buckles in the spinning, and upon the temperature of the blank when transferred from the furnace to the machine.

The huge spinning machine upon which these heads were formed consists of horizontal top and bottom formers, an inside corner roller and an outside quadrant roller. The disc to be formed is centered on the bottom former, which is mounted on a heavy vertical shaft, and the top former, suspended on a ram, is lowered onto the disc. There it is held in place by hydraulic pressure trans-

mitted through the supporting ram. Besides holding the disc during spinning, these formers, which are available with various radii for forming dished heads, press the dish in the area of the head they cover.

In operation the formers revolve, spinning the heated disc between the inside corner roller and the quadrant roller at one side. The quadrant roller moving up and down and in and out on the outer surface of the disc forms the knuckle radius and straight flange by curving the disc over the inside corner roller. At the beginning of the operation the quadrant roller is in a nearly horizontal position, while its position at the completion of the spinning depends upon the specifications for the flange. If the head is to have a conventional straight flange, the position of the roller at completion of spinning is

Why Blue Flash Mounted Wheels and Points Pay Off in Greenbacks

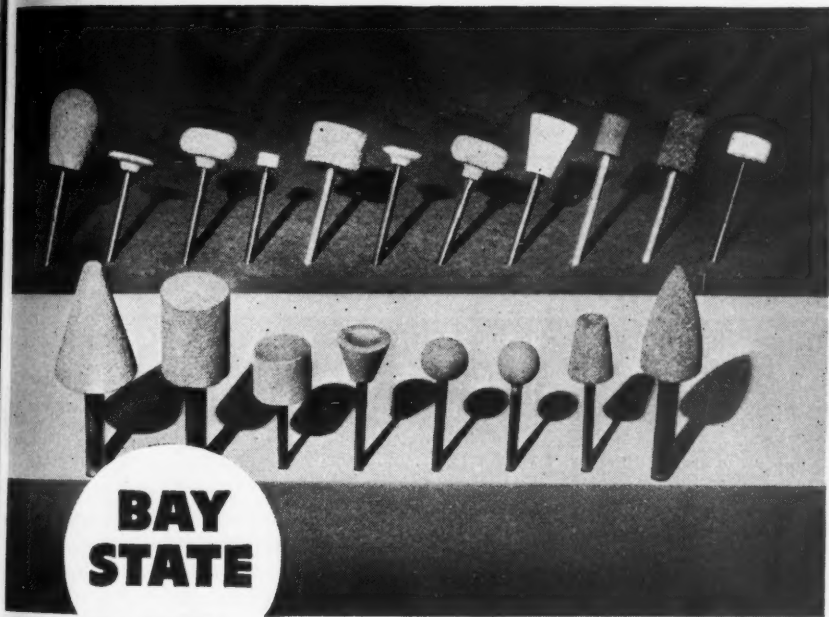
Blue Flash mounted wheels and points are ready for immediate cutting action as soon as you receive them. There is no wasteful "breaking in" period. What's more, they are free from hard and soft spots.

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Extra advantages like these will be found throughout the entire line of Blue Flash products . . . advantages that have earned Bay State a position of leadership for quality . . . the finest honing and superfinishing stones ever manufactured . . . portable snagging wheels with extra safety features . . . precision grinding wheels in fractional grades, etc.

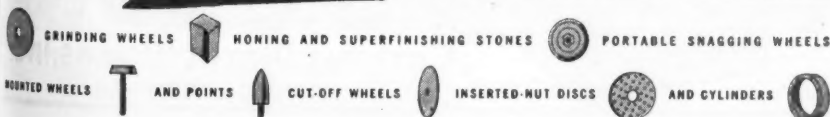
Check complete details on how Blue Flash Mounted Wheels and Points "pay off in greenbacks". Send for pocket-size catalog D.

BAY STATE ABRASIVE PRODUCTS CO.
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**BAY
STATE**

BLUE FLASH GRINDING WHEELS ***FAST and COOL***



MODERN MACHINE SHOP 167

August, 1944

vertical while if the flange is to be toed in or out, the roller will be inclined from vertical according to degree of deflection of the flange.

The finished heads measure 15 ft. 2 in. in diameter by 2¾ in. nominal gage (2½ in. minimum after forming), 3 in. straight flange, 47¼ in. over-all depth, 44¼ in. inside depth of dish, and weigh approximately 34,370 lbs. each.

A Correction

In the article "A Stove Builder Makes Bombs" which appeared in the April issue of this magazine the author made the statement that "two robots are maintained, work being rotated each five hours. . . ."

This statement was in error. The rotary spinners used to forge the bomb noses are of Barney Machinery Company design, and the robot which

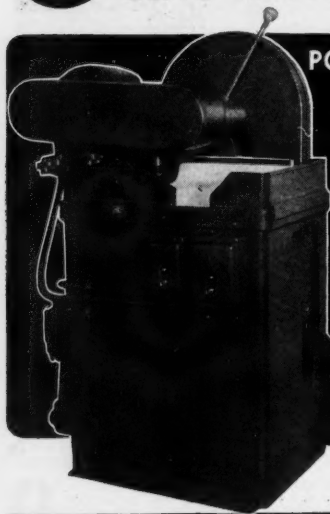
automatically shapes the nose was designed by the Wheeling Steel Corporation. Two spinners are installed in the forging department in order to minimize maintenance problems on the spinners. Work is alternated between the two machine so that while one spinner is running, the other can be serviced and lubricated.

Essentially, each spinner consists of three master parts, as follows: (1) a main table carrying the rotating arm and tool slide, (2) a tool slide which is cam-operated, and (3) a rotating arm. These master parts of the spinner are operated hydraulically, and the various hydraulic circuits are controlled by the above-mentioned Wheeling Steel robots.

Surface Combustion Production Forge Furnaces are covered in a four-page illustrated folder—SC-116—available free from Surface Combustion, Toledo 1, Ohio.

CATSKILL Abrasive Cut-Off Machine

CUTS FASTER, SMOOTHER, STRAIGHTER



POWERFUL • ACCURATE • SAFE

Cuts solids to 2" and tubing and shapes to 3"—cleanly—without secondary finishing operations.

MODEL "W"

Cutting wheel runs in slotted pipe through which coolant is piped. This prevents surface hardening, burr and burn, and insures a smooth, finished cut.

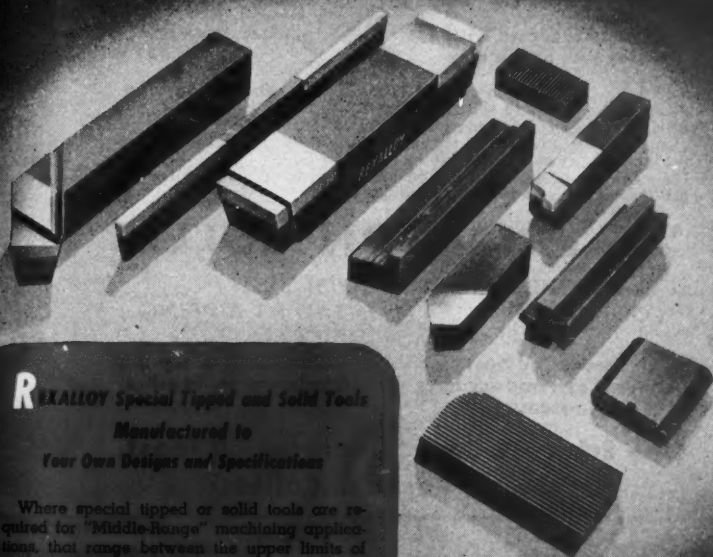
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ERICKSON Precision COLLET CHUCKS

Model "01" accurate within
.0005 or less at the nose.



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.001 or less at the nose.

The Erickson Precision Collet Chuck is outstanding for its super gripping strength and ability to maintain accuracy.

Erickson Engineers regularly solve problems for many types of manufacturers anxious to improve results and profit by savings through proper handling of work.

Uses and applications of the chuck to fit your requirements will gladly be recommended upon request.

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COLLAPSES $\frac{1}{32}$ " MAINTAINS GRIPPING
STRENGTH and ACCURACY

High speeds and heavy feeds may be used, as the 8 point grip and extreme accuracy of concentricity avoid vibration and loosening.

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Uses an inverted adaptation of The Erickson Collet. Inquiries solicited for your requirements.

**The ERICKSON
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An outstanding new development. Send for information covering this chuck for your tapping operations



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Leading manufacturers of newer equipment have been quick to recognize in the Erickson Chuck, a gripping means that adds to the accuracy and precision of their products. Inquire about Erickson Chucks for standard equipment.

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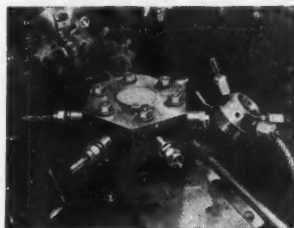
Model 201 High Speed Router Chuck with extended nose piece for pattern following.



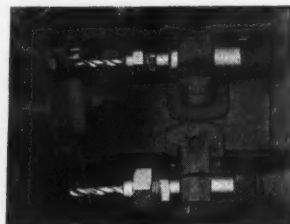
Vertical Milling operation with 101 Chuck.

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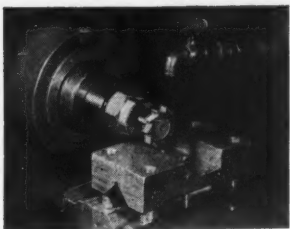
"E"



Main and auxiliary turrets equipped with Erickson Chucks. Note short drill overhang, taps and reamers.



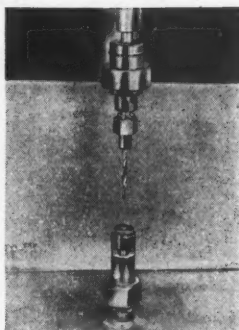
Models 102 and 402 Chucks in use on Automatic Screw Machine.



Horizontal Miller with 102 Chuck used to hold Woodruff Key Cutter.



Model 102 Chuck—adapted for standard floating holder operations.



Model 301 Chuck adapted to quick change production operation on upper spindle. Note self-contained, interchangeable drill bushings in special nose piece on lower chuck.

Hand Honing Lengthens Carbide Tool Life

By FRED W. LUCHT

Development Engineer, Carbolov Company, Inc., Detroit

THE vast increase in the successful use of cemented carbide tools for machining of steel castings and forgings since the beginning of the war has brought with it the requirement of giving a greater degree of attention to conditioning of the cutting

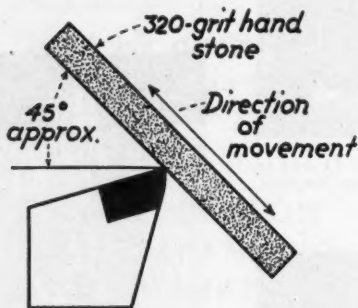
amount of honing equally effective in different operations.

A carbide-tipped tool which is to be used for the machining of aluminum and most other non-ferrous materials, for instance, should not be honed at all. On this type of work an extremely keen edge, lapped or diamond ground, will be found to stand up much longer and give far better results than will a honed edge.

As a matter of fact, the honing of cemented carbide tools applies mostly to the machining of steel. It gives the edge sufficient strength to stand up under severe use and—if the honing is done properly—will not interfere with the tool's cutting characteristics.

Hand honing the cutting edge of a carbide tipped tool increases the working life of the tool because scale and heavy chips are apt to make an extremely sharp cutting edge flake off. Honing also removes the microscopically ragged portions of the cutting edge sometimes present after the tool has been sharpened on an abrasive wheel. These minute ragged portions—if present—also have a tendency to "chip out."

The amount of honing required by any one tool depends upon the job to



edge of the tool in order to obtain maximum tool life.

In this connection, a slight (not over 0.005 inch) chamfering of the cutting edge of the carbide tool by hand honing has been found, on many jobs, to appreciably increase the life of carbide tools—when correctly done. Honing the cutting edge, however, is not a cure for poor results due to incorrect grinding. Nor is the same

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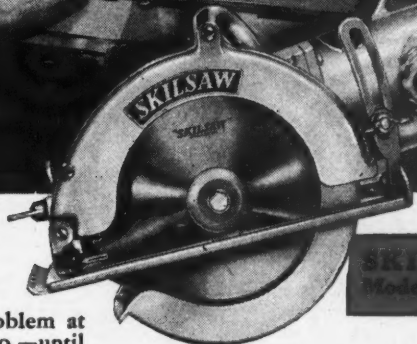
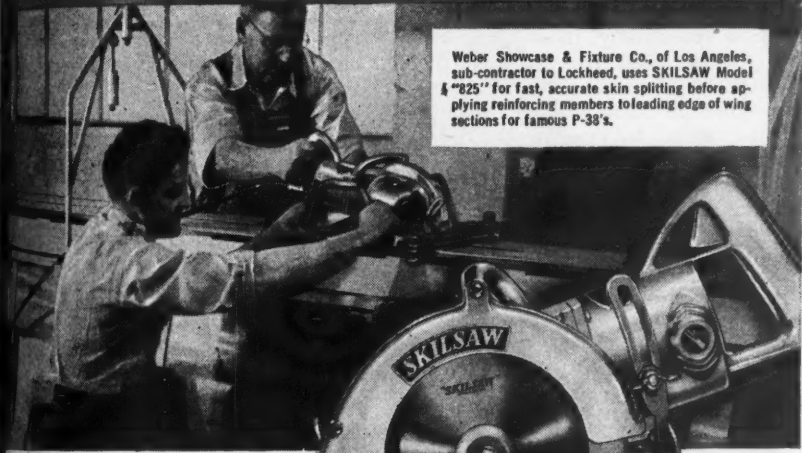
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P-38's Get Wings *Sooner* when **SKILSAW** is on the job!

Weber Showcase & Fixture Co., of Los Angeles, sub-contractor to Lockheed, uses SKILSAW Model # "825" for fast, accurate skin splitting before applying reinforcing members to leading edge of wing sections for famous P-38's.



SKILSAW
Model "825"

Here's another example of how war production speeds up when smart engineers put SKILSAW to work. Fast, accurate skin splitting was a tough problem at Weber Showcase & Fixture Co.—until Rubber Engineers solved it by putting SKILSAW Model "825" into a specially designed jig. Now, wings for P-38's roll off the assembly line faster, because SKILSAW is saving *time and manpower* on the important step in production.

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Engineers help
you men to plan
and execute pro-
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with SKILSAW's
newest tools.

Industry everywhere has found that SKILSAW is a most efficient cutting tool, with or without a jig. SKILSAW is powerful, compact, light in weight, easy to use . . . goes

right to the work, saves steps, saves material handling.

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MAKE AMERICA'S HANDS MORE PRODUCTIVE

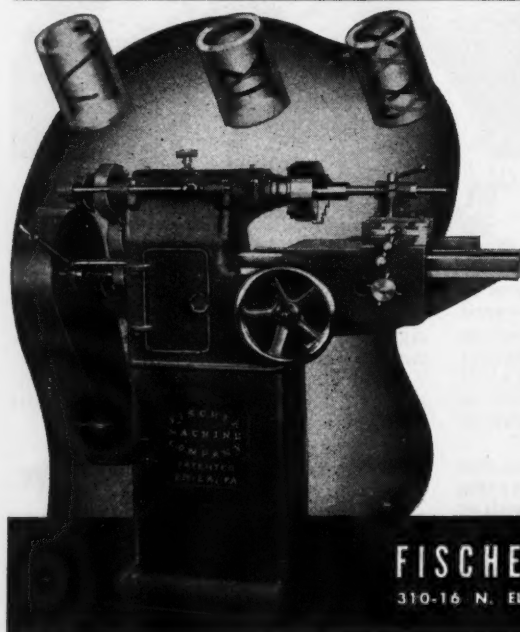
be machined and usually is best determined by experience. However, one general rule can be borne in mind: Within limits, the heavier and rougher a job is, the more the tool should be honed. It is also well to remember that **no tool should ever be honed more than is absolutely essential.** Furthermore, it is actually better to do no honing at all than to do it incorrectly, since incorrect or excessive honing will produce a tool which is not in the best condition for removing metal. The net effect of either is to merely "dull" the tool.

More specifically, those tools which are to be used for making finish cuts should receive a very light honing—just brushed lightly with the honing stone to remove the irregularities from the tool's edge. On tools intended for heavy roughing or interrupted cuts, the kat or chamfered surface left by the honing stone should be between 0.002 and 0.005

inches wide. If "light" cuts are to be taken, too much honing will make the tool too dull to cut most effectively.

Occasionally on a cut that is to be exceptionally heavy, it will be found desirable to hone the edge of the chip breaker as well as the cutting edge of the tool.

Sometimes, when there is scale stock to be machined or when interrupted cuts must be made, it will be found that a chip from the working part of the cutting edge will break off the **exposed** part of the cutting edge. In other words, a part of the cutting edge which is not cutting at the time (that is, a part which is outside of the cut proper) will chip out due to the action of the chip from the work. To prevent this from occurring, it is usually preferable to hone the exposed portion of the edge somewhat more than that part of the edge which will actually be bur



FISCHER *Oil Groovers*

A wide variety of grooves may be cut on the "FISCHER" . . . with minimum set-up time and cost.

Bearing in which groove is to be cut is mounted on revolving chuck secured on work spindle. Boring tool is secured to carriage slide which has a reciprocating motion timed with work spindle and lined by crank gear and connecting rod.

Several attachments can be furnished for cutting practically any type of oil groove.

Capacity of No. 1 Machine—5" dia. . . . No. 2 Machine—15" dia.

PROMPT DELIVERIES
Write for catalog.

FISCHER MACHINE CO.

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TAPPING

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**1st MORSE QUALITY
Serve As Your Guide
To The Same Economies.
That Morse Drills Have
Always Brought To Your
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**THERE IS A
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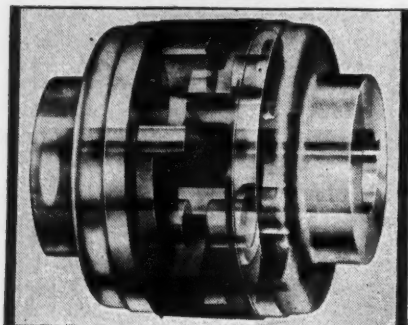
**TWIST DRILL AND
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**NEW YORK STORE: 130 LAFAYETTE ST. . . . CHICAGO STORE: 570 WEST RANDOLPH ST.
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INGENIOUS NEW PRINCIPLE "O-P" MULTIFLEX COUPLINGS

THREE UNIT SAFETY SMOOTH DESIGN

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A MASTER-PIECE FOR PRODUCTION

Today — and in the tomorrow — the transmission of power is a vital factor. **MULTIFLEX COUPLINGS** were designed to transmit that power under all conditions. **MULTIFLEX COUPLINGS** give greater **MULTIFLEXIBILITY** against heavy shock and pulsating loads in any direction, also compensating for **ANGULAR** and **PARALLEL MISALIGNMENT**. So — for insured production order **MULTIFLEX COUPLINGS**.

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WRITE FOR THIS EIGHT PAGE DETAILED FOLDER

AUTOMATIC MACHINE & TOOL CO.
132 CHARLES ST. AUBURNDALE, MASS., U.S.A.

led in the work.

In view of those factors, it is evident that all honing should be done by an operator who is familiar with the particular machining operation on which the tool is to be used.

The honing operation, of course, follows the finish grinding. The honing stone should be of about 320 grit. The accompanying drawing shows how this honing stone should be used for best results. The operator should hold it at about a 45 degree angle with the top of the tool and move it in the direction indicated by the double-headed arrow. He should also—and simultaneously give the honing stone a slight movement along the cutting edge of the tool.

The thing to remember is this; it is just as important to hone all cemented carbide tools correctly as it is to hone them at all. A few seconds with a honing stone before the machining operation starts will pay big dividends.

How BIG?

Republic Gage Catalog No. 1173. Republic Gage Co., 2228 Fenkell Ave., Detroit, Mich., has published a 94-page plastic-bound catalog containing illustrated, descriptive, and size and price information on thread gages, taper pipe gages, and cylindrical plug gages. In addition, this conveniently indexed catalog includes material on special gages and gaging practice, as well as tables and charts of thread elements; constants for finding pitch diameter and minor diameter of screw threads; thread forms; decimal equivalents, fractions, and millimeters; basic thread dimensions and tap drill sizes; basic thread dimensions (National extra-fine); standard taper dimensions; basic thread dimensions (Whitworth standard threads and modified gage threads); American National Acme screw threads; British standard threads and pipe gage threads; helix angles for millimeter screw threads; helix angles for inch screw threads; and so on.

Copy of Catalog No. 1173 is available free to executives addressing requests on their company letterheads.

NUCUT TWO-FILE FILING HELPS STEP UP WARTIME PRODUCTION

*Each NUCUT Stroke
Does TWO Filing Jobs*



NUCUT means new file-cutting efficiency. Try a NUCUT, and you'll immediately see why this is so. The coarse teeth cut clean, deep, true. The fine teeth level the surface smooth. This improved combination of both coarse teeth and fine teeth in "wavy rows" is a patented NUCUT construction making possible two filing operations at the same stroke,—without scraping or skidding.

Your distributor will be glad to suggest the proper

lengths, shapes and cuts you need to meet *your* particular requirements. Be sure to ask for the file with the WHITE TANG.

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Recognized as the most significant improvement that has taken place in modern file making, the patented NUCUT "Wavy Teeth" design enables the NUCUT File to cut both rapidly and smoothly. It works with a shearing cut, inasmuch as no two successive teeth in any longitudinal row are in alignment.

HELLER BROTHERS COMPANY

**America's Oldest File Manufacturers—Good Tools Since 1836
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**ASK FOR THE FILE
WITH THE WHITE TANG**



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MODERN MACHINE SHOP 177

Lincoln Electric Company Curbs Absenteeism

By Careful Investigation of Causes

A LOW absentee rate of 1½ to 2 per cent reported by The Lincoln Electric Company, world's largest manufacturer of electric arc welding equipment, Cleveland, Ohio, is attributed by the company to its incentive system.

The reputation for high production per man was built by Lincoln workers' interest in their contribution to the whole plant's production effort. The individual's interest is created by the incentive system under which factory employees are able to earn incomes averaging better than \$5,000 a year and which has attracted national attention during the 12 years it has been in operation.

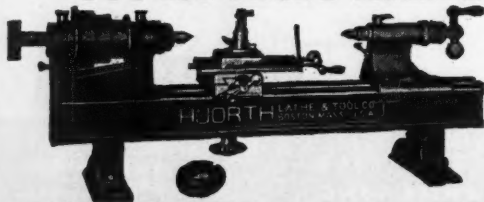
An absent or tardy worker detracts from the efforts of the others in his production team, the company explains, so special pains are taken to investigate the causes.

The system employed by The Lincoln Electric Company for checking

these causes is an interesting one. Employees pick up their time card on entering the plant, but do not ring in at the gate as in many plants. Instead, the worker carries his card to his department where he rings in when actually ready to go to work. At 20 minutes after starting time, all cards remaining in the rack at the main entrance gate are removed and taken to the personnel office. Each card removed is replaced in the rack with a red card.

In addition to giving the management a quick automatic check on the day's absentees, the system provides the personnel office with a direct way of talking things over with the employee when he comes in, late or the next day, because he must hand in the red card at the personnel office before he can get his regular time card. These interviews give the personnel office a wealth of information which could never be obtained from

... for more than 1001 odd jobs



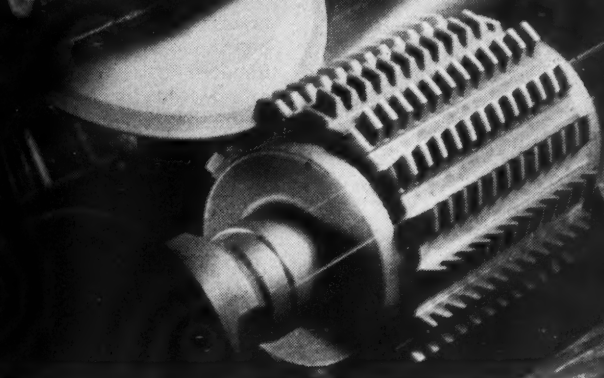
HJORTH LATHE & TOOL CO.

The Hjorth Bench Lathe has the speed, accuracy, handling ease, and dependability that appeals to every operator. That's why you'll find the better shops equipping with the Hjorth Lathe.

WRITE TODAY FOR DATA
AND PRICES.

12 BEACON ST., WOBURN, MASS.

HOW NOT TO PLAY HOB WITH A HOB !



ONE of the best ways not to play hob with a hob is to be sure of your grinding wheel and this applies to every piece of tool room grinding. But if you want to get the best results, be sure you have a free, cooling wheel that holds its shape like the "Aloxite" Wheel by Carborundum.

There have been a lot of new techniques developed during the last few years. New techniques in centerless grinding. New methods of cylindrical grinding. New ways to deburr, finish and polish metal. All of them have contributed to the progress of grinding. The man who knows all the angles is your Carborundum Sales

Representative. Let him survey your requirements. Perhaps he can help you do even a better job. Just consult nearest distributor or The Carborundum Company, Niagara Falls, N. Y.



Sales Offices and Warehouses in New York, Chicago, Philadelphia, Detroit, Cleveland, Boston, Buffalo, Pittsburgh, St. Louis, Cincinnati, Grand Rapids

Grinding Wheels by **CARBORUNDUM**

(Carborundum and Aloxite are registered trade marks of and indicate manufacture by The Carborundum Company)

ABSENT REPORT

Clock No.

Name

Your Clock Card has been withdrawn.

Report to

Bring this card with you.

REASON FOR ABSENCEPlant Injury ☐ Sickness, or Outside Injury ☐No Work ☐ Tardy ☐ Excused ☐ Unknown ☐**HOW REPORTED**Phone ☐ Letter ☐ Foreman ☐ Other Employee ☐

If no report why?

Signed

This employee is unable to work ☐

(Date)

This employee is able to work ☐

(Date)

By Dr.

What shift?

Off From A.M. P.M. Date

Returned A.M. P.M. Date

Days Lost

State specific reason for excused or unknown absence:

I agree that the above was the reason for my absence.

Employee's

Signature (Date)

Witness

"Red card" used by The Lincoln Electric Company shows pertinent data supplied by absentees

cold record alone.

Reasonable or unreasonable and explained or unexplained causes for absenteeism are included in the 1½ to 2 per cent rate of The Lincoln Electric Company, which contrasts with the general national average of 5 per cent.

The red card system also serves to spot any rising trend of unnecessary absenteeism in a department. The matter then is brought before the advisory board, composed of one elected member from each department, an elected foreman from each plant, two elected office representatives and two elected representatives of women workers in the plant. The board meets with the general manager of the company, two superintendents and the personnel director.

The advisory board plays an important role in the operation of the Lincoln incentive system and other matters affecting workers' welfare. The board's vital interest in uninterrupted production sees to it that any production hindrance, such as absenteeism in a department, is reduced to a minimum.

Emerson Riveting Tools. A catalog devoted exclusively to riveting tools and equipment is announced by the Emerson Engineering Co., 1418 S. Flower St., Los Angeles 15, Cal. The catalog is thoroughly illustrated and is divided into indexed sections on rivet sets, squeezer sets, dimpling tools, bucking bars, Hi-Shear riveting tools, and general riveting information. Copy free upon request.

Ideal Machine Tool Accessories. Including magnetic chucks, live center combination etchers and demagnetizers, metal etchers, portable demagnetizers, electric tachometers, grinding wheel dressers, balancing ways, variable speed transmissions, and electric cleaners, are pictured and described in a 12-page catalog now being offered free by the Ideal Commutator Dresser Co., 1031 Park Ave., Sycamore, Illinois.

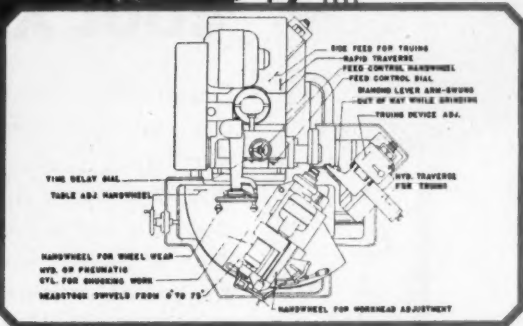
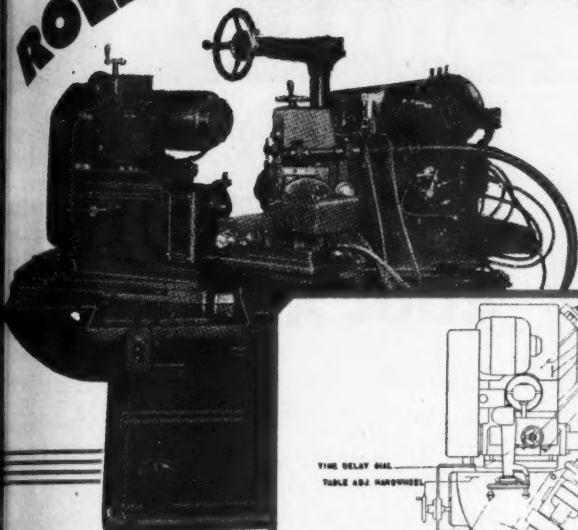
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GRIND BEARING RACES ON A FITCHBURG ROLLER



and other Chucking Grinding Operations

The latest Fitchburg Roller Bearing Race Grinder is a single standard Fitchburg Bowgauge Grinding Wheelhead Unit. The workhead is adjustable from 0 to 75 degrees so that the machine can be used for many other straight or taper grinding jobs.

The Fitchburg Roller Bearing Race Grinder is completely automatic. By pressing a single button the wheelhead goes through its standard automatic cycle — rapid approach to the work, proper grinding feed, spark-out and rapid return. Work is held to limits of .0002" production.

The workhead can be arranged either hydraulically

or pneumatically for collet clamping or other chucking devices.

In this taper grinding application, the wheelhead is mounted on a 45° slide for truing. The truing device is mounted on the side of the base parallel to the wheelhead, and is hydraulically operated for truing, with micrometer adjustment for positioning.

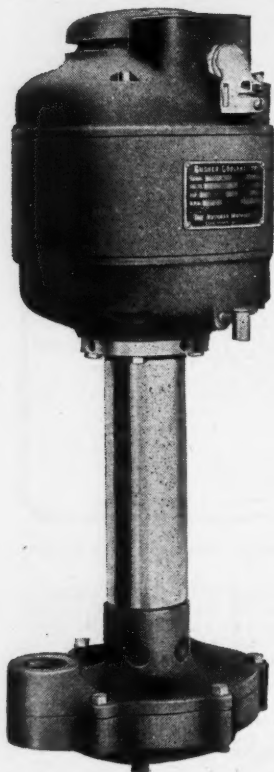
For grinding roller bearing races a Fitchburg grinds them faster and more accurately than other methods. A leading American manufacturer reports enthusiastically on the quality and low production cost of this machine. Write us today for complete information.

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FITCHBURG, MASSACHUSETTS, U.S.A.

Manufacturers of — Bowgauge Wheelhead Units, Multiple Precision Grinding Units, Spindle Grinders, Cylindrical Grinders, Gear Grinders, Rack Full Universal Grinders and Special Purpose Grinders.

NO "time out" for SHUT DOWNS



Model TL-7320

See Section 2 of new catalog,
indexed for quick reference.

No Clogging—No Leaking

GUSHER COOLANT PUMPS

Gusher Coolant Pumps are notable for their steady performance—24-hour-a-day operation. Grit and chips in the coolant pass through a Gusher without the least harm. Having no packing nuts, no metal-to-metal contacts, no relief valves, the Gusher performs without auxiliary strainers. Available in many sizes and types — can be throttled from a mere dribble up to 200 g.p.m. . . . There is a Gusher model and type for your special needs .

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Gusher Pumps — Patented and
Patents Pending

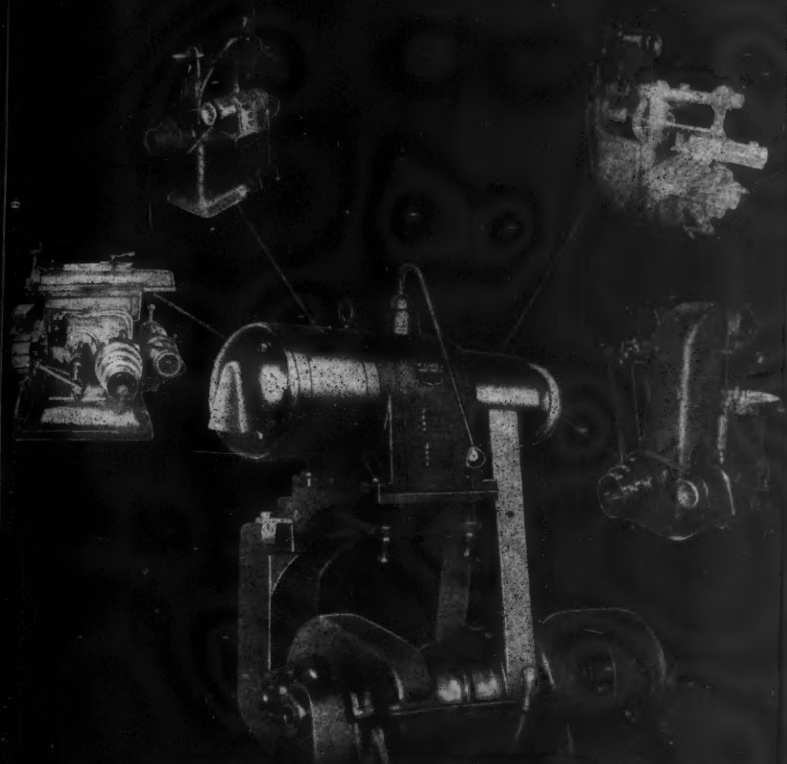
THE RUTHMAN MACHINERY CO.

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THE "GUSHER"—A MODERN PUMP FOR MODERN MACHINE TOOLS.

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LIMA GEARSHIFT DRIVES
for Machine Tools requiring
selective speeds ... 1 to 25 hp.



*Large Enough To Successfully Serve You, Yet Small Enough To Give
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THE LIMA ELECTRIC MOTOR CO.

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REPRESENTATION IN MOST PRINCIPAL CITIES

LIMA GEARSHIFT DRIVES - LIMA ELECTRIC MOTORS
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SPECIAL METAL CUTTING

WITH STANDARD RACINE SAWS

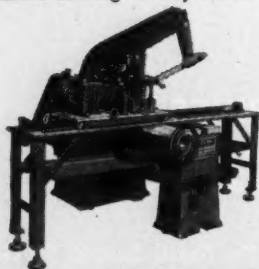


A STANDARD Racine Saw many times eliminates the need of a special machine to perform a special metal cutting job. The tilting saw guide, open front design and exceptionally rugged construction of Racine Saws, make them easily and readily adaptable to many special metal cutting operations.

Racine's Hydraulic Control of feed and pressure of the saw blade provides fast, efficient cutting of any metal from soft

aluminum tubing to hard alloy steels regardless of density or shape.

Available are a complete range of sizes in capacities 6" x 6" to 20" x 20". Write for Catalog No. 12 for complete information. Address Dept. MM-S.



SPECIAL FIXTURES ARE EASILY ADAPTABLE TO STANDARD RACINE SAWS

At left is shown a standard Racine Machine equipped with a special fixture for cutting crank-shaft test sections and forging flash. Special jigs and fixtures are easily mounted for sawing odd shaped material or special pieces. Racine engineers invite your inquiries on special and standard metal cutting jobs—no obligation of course.



RACINE OIL HYDRAULIC PUMPS AND VALVES

A Modern Source of Hydraulic Force

For use where force is required to perform molding, pressing, feeding, holding and numerous other operations. Racine Pumps are available in three sizes 0-12, 20 and 30 G.P.M. Pressures up to 1000 pounds p.s.i. Also Racine oil hydraulic Four-Way Control Valves with "balanced piston-sleeve type" construction. Sizes $\frac{3}{8}$ " to $1\frac{1}{2}$ ".

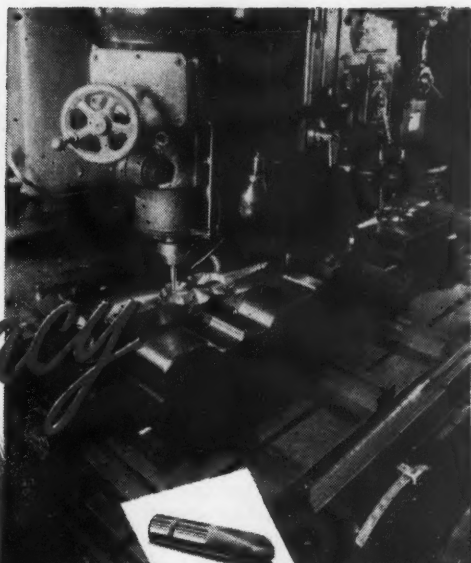


RACINE
TOOL AND MACHINE
COMPANY
Standard for Quality
and Precision
RACINE, WISCONSIN
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GEAR YOUR CUTTING
TO **T-J**

Accuracy

WITH MORE WORK
BETWEEN GRINDS!



Give your cutting operations the extra measure of *speed, accuracy and efficiency*... assured with T-J DIE SINKING MILLING CUTTERS!

Shop men find they get more work between grinds with T-J Cutters. Designed

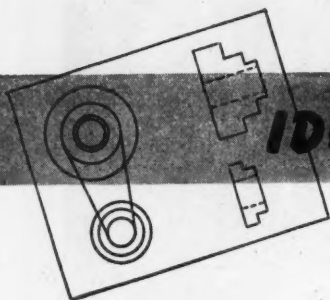
and built *right* for sturdiness... ability to hold a sharp edge longer... and carry less breakage percentage. Made from a standard, extremely high grade steel... assuring extra strength, wear resistance and uniformity. Backed by long years of T-J Leadership in building better cutters! Write for catalog.

The Tomkins-Johnson Co., Jackson, Mich.

FOR TOUGH JOBS SPECIFY



TOMKINS-JOHNSON
DIE SINKING MILLING CUTTERS



IDEAS FROM READERS

Simple, Efficient Expansion Arbor

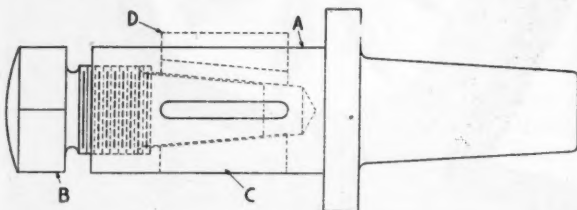
By W. A. STERN

THE drawing illustrates the design of an expansion arbor which we made in our own shops and which we have found to be very useful. It is especially valuable on contract work, where practically every job is different and usually consists of but a few pieces.

The arbor was designed for use on

inch, 2 inch, and $2 \frac{7}{16}$ inch, with which we can handle practically any job necessary in our class of work. The body of the arbor should be of some good grade of steel, such as nichrome, ry-case, or axle steel, and the screws and keys are of cold rolled steel, case hardened.

The arbor consists of the body, A, a tapered and threaded plug, B, and four sliding wings, C. The working end of the body has a taper hole bored in the end and extending back nearly half the length of the body, as shown to take the tapered screw B. At the entrance to the tapered hole a straight section is bored and threaded to take a corresponding thread on the tapered screw, as shown. The taper on the screw corresponds to the tapers on the bottom surfaces of the sliding wings. The



Drawing of Expansion Arbor

a milling machine to mill spiral jaw clutches, but has since been found useful on a wide variety of work such as in the cutting of spiral, bevel and spur gears, cams, segments, and similar jobs that require milling. An arbor of this type is also useful on lathe work, as it eliminates the necessity for an arbor press.

The arbor is simple and easy to make. We have made three sizes; 1

top, or outer surfaces, of the wings are straight and parallel with the centerline of the arbor.

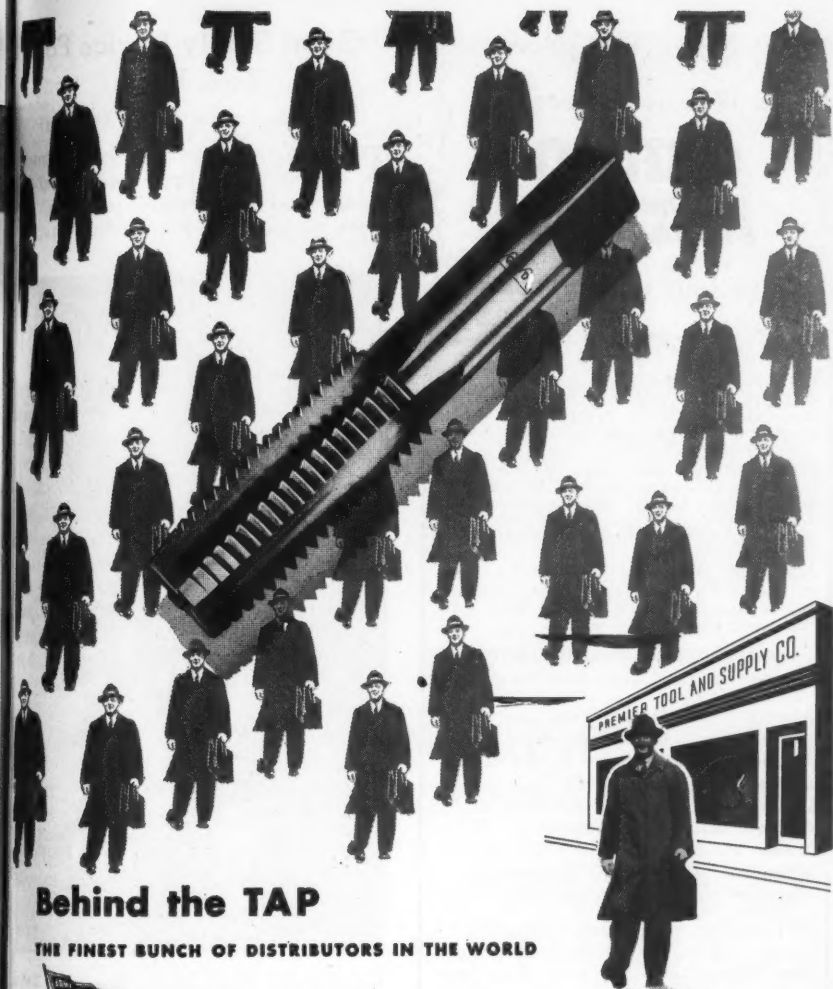
In use, as the taper screw is threaded into the end of the arbor, the wings C are forced outward, providing the necessary expansion to grip the inner wall of the work. The line D shows the position of a wing after it has been expanded by the action of the screw B.

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gust, 1944



Behind the TAP

THE FINEST BUNCH OF DISTRIBUTORS IN THE WORLD



Yes, you get more than a fine tap when you specify "Greenfield"—and one of the most important *plus values* you receive is the "on the spot" service of Greenfield Distributors. Your local "Greenfield" Distributor carries a complete stock. He can be at your side in a few minutes. In nearly every industrial center in America you will find

that the leading small tool supplier is a member of the nation-wide "Greenfield" distributing organization, devoted to helping you solve your production problems.

*Years
For Better
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MODERN MACHINE SHOP 187

August, 1944

In War, as in Peace...

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Save time and cut costs!

CERROMATRIX (Melting Temp. 250° F.) For securing punch and die parts, anchoring machine parts without expensive drive fits, short run forming dies and other metal-working applications.

CERROBEND (Melting Temp. 158° F.) Used as a filler in bending thin-walled tubing to small radii. Easily removed in boiling water. Also used for aircraft assembly jigs, templates for forming dies and other purposes.

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Copper Corporation**

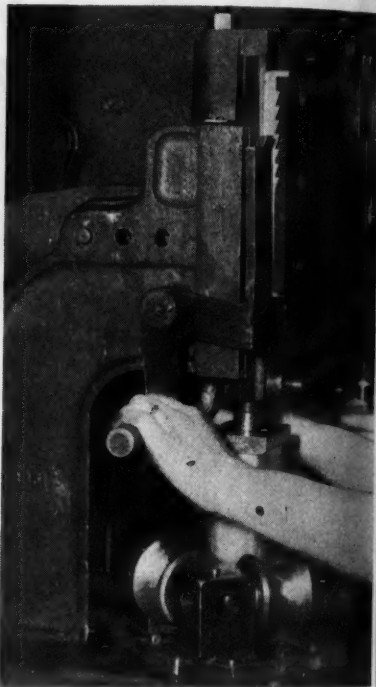
40 WALL ST.

NEW YORK 5, N. Y.

Good Safety Device For Kick Press

(Courtesy General Electric Company)

THE illustration shows a small kick-press equipped with a safety device that was originated by C. S. West of General Electric's Pittsfield



Simple Safety Device Keeps Operator's Hands out of Danger Zone

Works, and which is as effective as it is simple. Both of the operator's hands are kept out of the danger zone, because the operator must use both hands to release the safety device before the press can function.

The device consists primarily of a steel plate, with ratchet teeth cut in both sides to face the rear of the machine, and securely anchored to

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Pittsfield



Get this new aid
**THAT HELPS IDENTIFY
WELDING TROUBLES**

New trainees learn to spot faulty welding procedures faster... "old hands" can increase their efficiency... with the help of this new 24-page book. By stressing accurate visual inspection, it helps boost both weld quality and quantity.

Each of 14 common welding troubles is illustrated; causes are analyzed; cures are outlined.

The book is pocket-size—ideal to take home to read or keep handy to consult on the job.

It's a handy trouble shooter for problems like splatter, corrosion, undercutting and brittle joints. Order a copy for each of your welders today.

This same information is also made available by Westinghouse in chart form for wall mounting. Write for free copies of booklet B-3326 and chart DC-250 on your company letterhead. Westinghouse Electric & Manufacturing Company, East Pittsburgh, Pa., Dept. 7-N. J-90497-1-A



Westinghouse
PLANTS IN 25 CITIES... OFFICES EVERYWHERE

Welders, Electrodes and Accessories

MODERN MACHINE SHOP 189

August, 1944

the movable slide head. Attached to each side of the machine column is a "dog-leg" pawl which engages the ratchet teeth. The arm carrying the pawl is pivoted so that as the handle at the lower end of the arm is pulled toward the operator, the pawl disengages from the teeth and frees the ram to drop when foot pressure is applied. With a pawl on each side, both hands are required to release the ram; thus both hands are busy

elsewhere when the ram drops.

Besides assuring safety, the device helps to lessen fatigue because it provides means for the operator to brace herself naturally when applying pressure on the foot treadle.

Assembling Nuts in Difficult Places

By J. R. STEEN

Harvey-Wells Communications, Inc.,
Southbridge, Mass.

IT is an old wrinkle to magnetize a screwdriver so that it will hold a screw and thus make it possible to insert and drive a screw in a place that is difficult to reach with the fingers, or where the space is too small to admit both the screwdriver and the fingers, the use of this idea for holding nuts and their close companions, lock washers, has been neglected.

A magnetized wrench is a very handy tool when it becomes necessary to assemble steel nuts and lock washers in hard-to-get-at places. To magnetize the wrench, wind about a dozen turns of insulated wire around it, then touch the ends of the wire across the poles of a storage battery. A single touch will be enough, and the magnetism will be sufficient to hold both the nut and the lock washer.



**SEE
BETTER**

•
**WORK
BETTER**

•
Keep hands
free

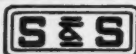
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2 1/4 x HEADBAND MAGNIFIER

Use of both eyes reveals true depth of details. Magnification of 2 1/4x. Free working distance, 8" to 10", permitting unhindered use of hands. By just lifting your head, your eyes are free for any other activity. Eyeglasses may be worn while using. Highest optical quality. Eyshade of Tenite—practically unbreakable. Write for leaflet.

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**VARIOUS WIDTHS
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**BUTTS AND
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**JOHNSON
BRONZE**

SLEEVE TYPE BEARINGS



Specify
**JOHNSON
GENERAL
PURPOSE
BEARINGS**

Ready to Use . . .

JOHNSON General Purpose Bearings save precious time in many ways. When you place your order you have over 800 sizes to choose from. This enables you to buy exactly according to your needs. Every General Purpose Bearing is completely machined inside—outside and ends. Thus they are ready for immediate installation. There is no extra machining . . . no cutting down . . . no excess stock to remove. Oil grooving, slots or holes are easily, quickly and economically added when necessary.

When properly installed, Johnson General Purpose Bearings will deliver a maximum of service with a minimum of attention. The next time you need plain, cast bronze bearings—call in your local Johnson Distributor. Permit him to show you how to save both time and money . . . how to avoid waste and delay by specifying Johnson General Purpose Bearings.

JOHNSON

SLEEVE BEARING

590 S. MILL STREET



BRONZE

HEADQUARTERS

NEW CASTLE, PA.

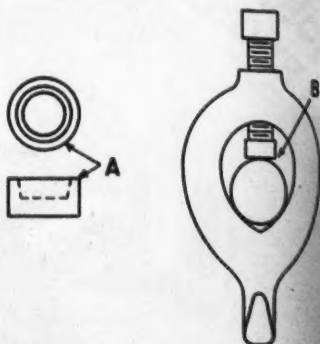
"Non-Marring" Dog Setscrew

By A. H. WAYCHOFF

SOONER or later every machinist or toolmaker will be given a job that must be held with a dog for turning or threading in the lathe, but which must not be marred. To avoid marring the work with the usual lathe dog setscrew it is customary to use a small piece of sheet brass or copper between the end of the screw and the workpiece, but if the sheet metal is thin the screw will indent the work, and if the workpiece slips while a cut is in progress the workpiece will be marred anyway.

The writer has found that it pays to machine a few cup-shaped pieces like that shown at A in the drawing for use in such cases. The piece A is cut from the end of a bar of soft brass, of sufficient diameter so

that when the cup has been made, the end of the lathe dog setscrew will fit into it.



Cut Made from Brass Bar Stock Protects Highly-Finished Work when Held in the Lathe

When working on highly-finished work, a brass cup is placed over the end of the setscrew as shown at B. The bottom of the cup will be thick



MODEL
1236
36-in. Throat
12-Gauge
Capacity

CIRCLE CUTTING ATTACHMENT
Included as Standard Equipment
With This Machine

3-11-43

Cuts...inside or outside ... straight or curved ... flat sheets or formed work

Even an unskilled operator can follow a scribed line, easily and rapidly. Shears flat or formed sheet metal, internal or external, plain or irregular shapes. Vision is unobstructed; both hands are free to guide work at all times. No resistance to feeding or turning. Action of cutters does not "feed" material. *Write for Bulletin.*

Made in sizes up to 60-in. throat, 10-gauge capacity

Cleaner, smoother edges
... need no finishing

Libert Hi-Speed SHEAR

LIBERT MACHINE COMPANY, GREEN BAY, WIS.

en made,
setscrew

Smooth, Simultaneous

**BURRING •
FINISHING • POLISHING**

**Rubber
Cushioned Brightboy**

THIS BRIGHTBOY WHEEL was purposely split to show the even impregnation of the abrasive clear through its resilient rubber binder.

**Does
It!**

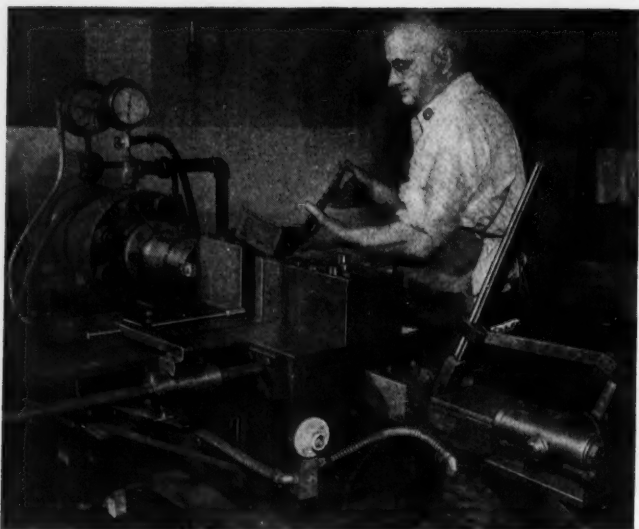
BRIGHTBOY'S balanced rubber and abrasive combination enables you to cover simultaneously the production steps between the grind and the buff.

Interesting production literature gives you detailed information on Brightboy's time and labor-saving short-cuts. The price list and catalog tabulate and illustrate the wide variety of shapes and sizes in which Brightboy is made for extensive machine and manual applications. Write for this information. And if you have a special problem, Brightboy dealer representatives and service men will be glad to work with you, without obligation.

BRIGHTBOY INDUSTRIAL DIVISION, WELDON ROBERTS RUBBER CO., NEWARK 7, N. J.

WELDON ROBERTS

B r i g h t b o y



Operator Removing Bus Bar from Dies on Hydraulic Press where the Bar has Just Been Formed. Pressure Gauge with Presselective Points is Visible at Left

enough to prevent indenting the work with the screw, and if by chance the work should slip, the brass cup will remain on the end of the screw and thus protect the work.

Simple Control For Hydraulic Press

BY adding a presselective pointer to a pressure gage and arranging a control circuit to be energized by contact between the pointer and the

bars of assorted thickness and widths to various angles. It works at a three stroke per minute cycle, and is of semi-automatic design.

The pressure gage to which the presselective pointer was added is a standard type instrument with a 5-inch dial. When pressure is built up to the point where the gage hand touches the pointer, the contact closes the circuit in an instrument contact-making relay. This energizes a 50-pound-pull solenoid which trips a spring mechanism on the valve, reversing the motion of the ram.

gage hand, the problem of precise control for a 50-ton hydraulic press was solved by Emerich Stern, a methods man at General Electric's Schenectady Works.


The press operates at 2,000 to 3,000 lb. psi and is used to bend bus

"OUTWEARS

the best

Bronze Metal"

20 years



without
a drink

ARGUTO OILLESS BEARING CO

Wayne Junction, Philadelphia, Pa.

POWERFUL HELP

for Tough Drilling Problems

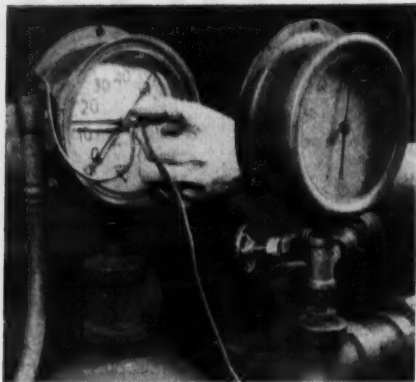
Take a Stanley Drill anywhere to the job! Plug it in a light socket and it's ready for all the toughest work. Stanley Heavy-Duty Electric Drills are built to handle all drilling operations — and are used by steel workers, millwrights, mechanics, plant electricians and for production work in metal plants.

Stanley Drills are available in capacities from $\frac{1}{4}$ " to 1". Send for descriptive literature. Stanley Electric Tool Div., The Stanley Works, New Britain, Conn.



STANLEY

ELECTRIC TOOLS FOR INDUSTRY



Close-Up of Pressure Gauge Showing Pre-selective Pointer Being Adjusted

Releasing pressure by this method has certain advantages over the bypass type of pressure control. Water loss is minimized. Selection of desired pressure or tonnage over the entire range of the cylinder's capacity

is simple. Where oil at high pressure is used instead of water, the method eliminates heating of the oil caused by continuous by-passing through the valve.

Gage-Set Eliminates Errors

Courtesy Lycoming Division,
The Aviation Corporation

TO gage the grinding of eight bearing surfaces on the crankshafts for its radial air-cooled, aircraft engines, the Lycoming Division of The Aviation Corporation has provided a series of standard gages, each equipped with dial indicators pre-set for a given diameter. An operator has merely to select the proper gage in rotation as he grinds the series of bearing surfaces. Held in position by a standard grinding gage arm, the dial indicator is pre-set to register

STANDARDIZED in War Plants

STRAND SWEEP SAFEGUARD assures Production with Safety

The only Sweep with DOUBLE CAM ACTION that incorporates Synchronized Stroke, R.P.M., and Length of Sweep. Puller Bracket (attached to ram) protects operator from pitman screw breakage.

ADJUSTABLE . . . REVERSIBLE . . . and "tailor-made" to fit your press dimensions.

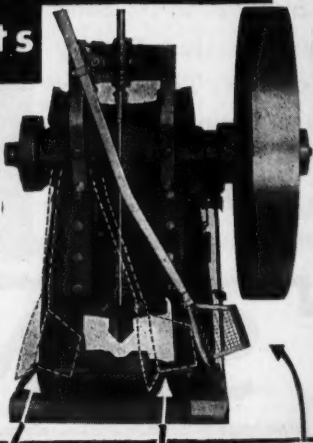
For price quotation, send us stroke of your press, front length of bolster and distance from bolster to crank shaft center.

Write for Circular

STRAND MFG. CO.

Safety Engineers

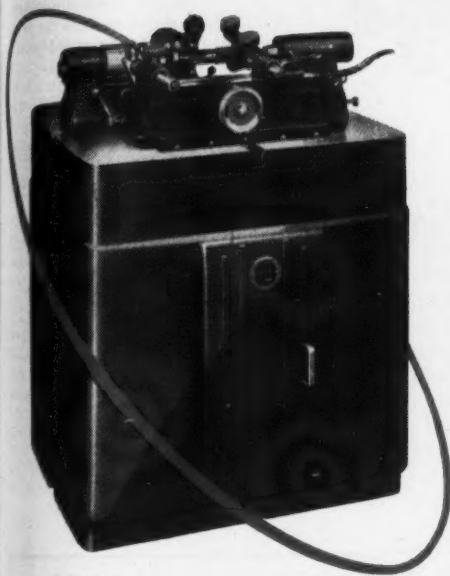
156 N. Desplaines St. Chicago 6, Ill.



Arm completes sweep with a slight downward movement of the ram.	Starting point of sweep can be set as close to die as the job requires.	Sweep Arm travels ahead of the ram. Operator cannot work around guard.
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Check GEAR ERRORS

INDEX • HELIX ANGLE • LEAD
TOOTH SIZE • ECCENTRICITY
INTERFERENCE • WOBBLE



The Red Ring Universal Gear Checker is a simple, compact, instrument for accurately checking dimensional errors in either spur or helical gears. With the application of special equipment, this machine will check leads accurately against a master lead gage, errors being registered on a "tenth" indicator. Its simplicity makes it possible to check gears quickly without sacrificing accuracy. Its ingenious design practically eliminates the human equation and therefore the need for skilled operators.

The Red Ring Universal Gear Checker is built in three sizes, the 12" size for gears from $\frac{1}{4}$ " to 12-11/16" O.D., the 18" size for gears from 2" to 18 $\frac{7}{8}$ " O.D., and the 24" size for gears from 3" to 24 $\frac{7}{8}$ " O.D.

WRITE FOR
DESCRIPTIVE BULLETIN

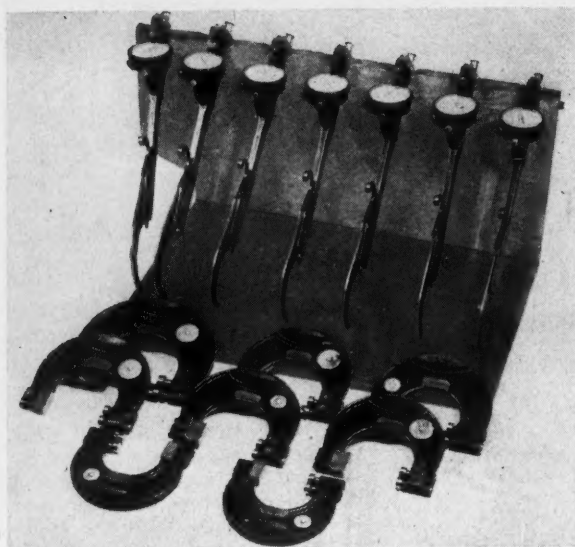
**NATIONAL BROACH
AND MACHINE CO.**

RED RING PRODUCTS

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SPECIALISTS ON
SPUR AND HELICAL
INVOLUTE GEAR PRACTICE

ORIGINATORS OF
ROTARY SHAVING AND
ELLIPTOID TOOTH FORMS



Set of Standard Gages Used in Machining Bearings on Lycoming Engine Crankshafts

the method requires only one setup per part instead of one for each diameter, and eliminates the frequency of error occurring when the operator has to reset a single gage with a micrometer for each bearing in sequence.

"How One Company Organized to Handle War Contract Terminations" is the subject of a 12-page bulletin — designated as the No. 649 which is now being offered free of charge by Lyon Metal Products, Inc., Aurora.

zero when the required diameter is reached.

This method has the advantage of greater accuracy, is faster and, at the same time, reduces the plant's inventory of partially completed crankshafts. When only one gage is used, it is the accepted procedure to grind a given diameter on a number of parts, then reset the gage and run them through again for the next diameter in sequence.

Beyond this advantage of reduced inventory crankshaft material,

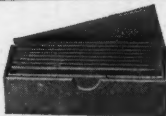
III. The bulletin presents a suggested breakdown of termination duties by departments, with time limits for each department set. In addition it illustrates 14 practice-proved forms which the particular company under discussion designed to expedite the work.

Many companies faced with terminations for the first time should be able to adapt this plan in part or in its entirety and thereby save considerable time and effort. Once the method and the personnel within a company are organized to obtain the facts, any termination regulation changes can be easily fitted into the already established method of handling.

ANDERSON HAND SCRAPER and BLADES



One blade is equal to an ordinary hand scraper reformed about 5 times. When it is worn out a new blade makes a new scraper. Blades need stoning but no grinding. Blades are



$\frac{1}{8}$ " thick from end to end and of correct hardness. Three sizes: $\frac{3}{4}$ ", 1", $1\frac{1}{4}$ ".

Try these fast, cost-cutting tools.

Write for complete details.

ANDERSON BROS. MFG. CO.

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*"ULTRA-FINISH"

*puts
new-precision
faces on*

GAGE BLOCKS!



*"ULTRA-FINISH"... developed by FONDA engineers... is the advanced new method of processing the gaging surfaces of FONDA gage blocks. It utilizes a special compound in the machine-lapping operation.

CHECK THESE "ULTRA-FINISH" ADVANTAGES

1 It produces a surface of amazing new smoothness.

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3 Together with FONDA'S other special processes for wear-resistance, it enables the gage blocks to hold their original high accuracy during long-extended periods of service.

4 It makes the use of oil or other film unnecessary in wringing—thus eliminating errors in fine-precision measurement.

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6 It enables you to better control your precision standards... to facilitate your work... to cut rejects and refinishing to a new low minimum.

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FONDA GAGE COMPANY

STAMFORD, CONNECTICUT

Agents in all principal cities throughout the World



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FONDA

Gage Blocks

**PASSED HIGHEST TESTS
DEvised BY THE NATIONAL
BUREAU OF STANDARDS**

Wage Incentives Increase Production in 86 Plants

THE value of wage incentive plans as aids to greater production is shown by the fact that, in the Chicago region of the War Labor Board, 86 plants using wage incentive systems found that productivity increased an average of 45 per cent within 90 days after the plans were installed, according to a recent statement by John W. Nickerson, director of the War Production Board's Management Consultant Division. The wage incentive systems also increased the earnings of the workers in the 86 plants by 19 per cent.

"These 86 plans in the Chicago area were all voluntary plans submitted to the War Labor Board with the agreement of labor and management," Mr. Nickerson said. "They were not necessarily the best plans which could have been devised. They were just plans worked out locally, often with such advice and assistance as we in WPB and WLB could give. They were of all types, but they all provided a monetary incentive varying in some way with effort."

In citing the positive results shown by the wage incentive plans in the Chicago area, Mr. Nickerson commented on the fact that a great diversity of opinion as to the desirability of wage incentive plans exists among some managements and some unions. He explained that "often they have had experience of abused application which they feel gives sufficient cause for rejection."

Stressing that a successful wage incentive plan calls for co-operation by both management and labor, Mr.

Nickerson urged an open-minded approach toward the subject, not only for the immediate purpose of increasing war production, but also for the long-run purpose of reducing unit costs and thus making possible the large-volume purchase of the nation's peacetime products, both at home and abroad. The results of well-administered incentive plans, he said, "can be measured in increased production, higher wages and lower costs—each of which tends to increase the possibility of greater and more steady employment."

Mr. Nickerson pointed out that the essence of a wage incentive plan is "real agreement and understanding" between labor and management, and pointed out that the War Labor Board requires that "before any new wage incentive plan may be installed, it must have the written approval of the union (where there is one) as well as that of management."

Mr. Nickerson heads WPB's nationwide staff of industrial engineers who are available to consult with war plants on the proper steps that should be taken in installing wage incentive plans for the purpose of increasing war production. Full information will be supplied by Mr. Nickerson upon request.

Where the Fuel Goes!

When traveling at top speed, a modern destroyer consumes more than 1,000 gallons of oil an hour.

A mechanized division burns up 2,000 gallons of gasoline in one hour of combat.

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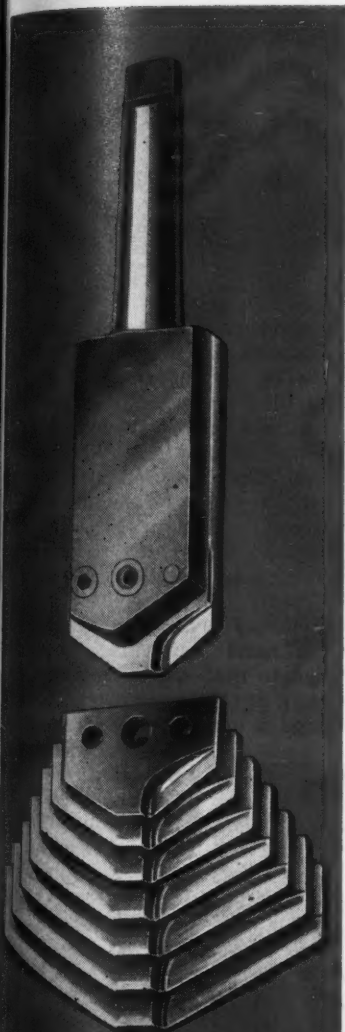
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gust, 1944



showing how various stand-
ard size CONNER drill tips
are interchangeable and
accommodated in constant
length holder.

Now . . .

A MULTI-TIP DRILL!

**CUTS
YOUR
DRILL
INVESTMENT**

Over
90%

**IN
INVENTORY
AND
STORAGE SPACE**

Here's the new advance—the new devel-
opment for larger sized drills you've been
waiting for—the **Conner Multi-Tip Drill**.
Comes in standard taper-shank holders.
Standard drill tips are furnished to drill
from the solid. Each holder will accom-
modate several interchangeable drill tips
(standard size). These tips are made of
hardened high-speed steel in steps of
1/16". Special holders and special sizes
also available, permitting many extensions.

For special applications, one design per-
mits oil under pressure to be flushed
directly on the cutting edge of the drill
tips by having an oil hole through the
shank and forking out to each lip of the
drill. Then there are extensions for deep
hole drilling with cross slots on the end
which fit the rectangular section of the
holder—thus taking all the strain off the
tang. Any type or size shank can be fur-
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*Write for literature and prices. Learn at what
an unbelievable low cost you can be fully
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CONNER TOOL & CUTTER CO.

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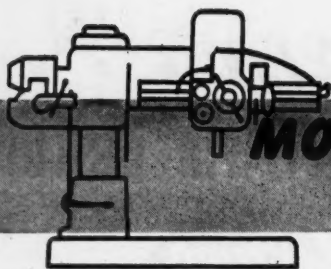
Please send me literature on MULTI-TIP DRILLS.

FIRM NAME _____

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MODERN EQUIPMENT AT WORK

Mechanical Hardness Tester at Martin Aircraft Saves Time

A MECHANICAL device for testing and automatically certifying the hardness of sheet metal parts, designed and built by Adolph Vleck, Jr., of the Inspection Department has saved more than 1,050 man hours at The Glenn L. Martin Company, Baltimore, Maryland, during the last 11 months, and even greater savings are expected as additional units, now under construction, are placed in operation. An estimated three million

parts have passed through the original machine during the first 11 months of operation at an average saving of $1\frac{1}{4}$ seconds per part over the methods previously used.

Known as the Martin Hardness Certifier, the new machine was invented by Inspector Vleck not primarily as a time saver, but as a means of increasing accuracy in certifying the hardness of aluminum alloy parts.

Previously these parts were tested with a hand tester and the operator had to read the results of a dial. He took in the neighborhood of 20 readings a minute, and at this speed

there was always the possibility of his reading 80—the low limit for ST condition—when the needle actually read only 60 or 74, indi-

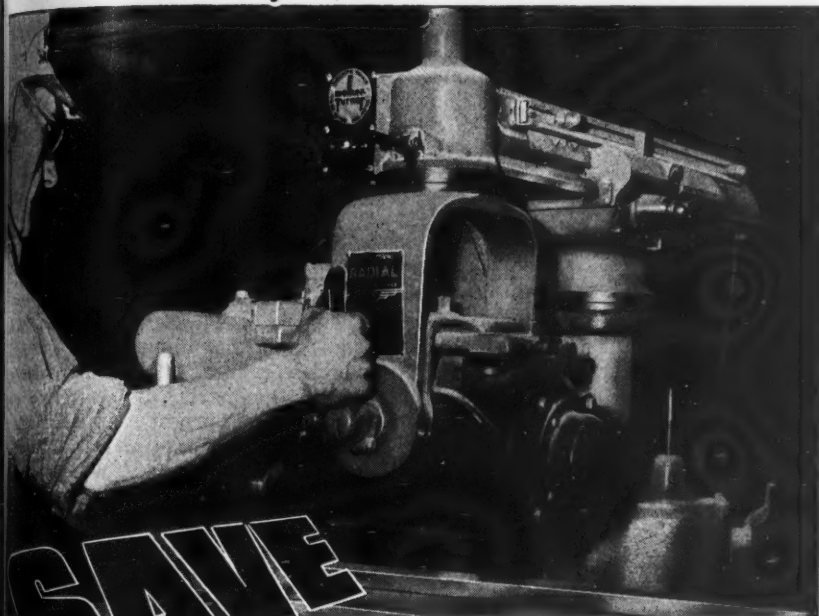


Adolph Vleck, Inspector, Army Division, of The Glenn L. Martin Company, Baltimore, Maryland, demonstrates the automatic Hardness Certifier which he developed to increase accuracy and speed the testing of sheet metal parts. The new machine tests the part and stamps it with the inspector's personal stamp and the heat treat stamp in approximately half the time formerly required.

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SAVE

Time, Labor, Cost **WHEN CUTTING LONG OR BULKY WORK!**

Workpieces of wide area often cause costly jams in production lines—unless you speed the work on its way with versatile Walker-Turner Metal-Cutting Radial Machines and Band Saws.

These fast, accurate machines relieve overworked, heavier cutting units, and even serve as "first line" production equipment on lighter work. Their wide range of speeds brings practically all materials within their scope. Their simple, easy operation makes every man-hour more productive.

Write today for detailed literature.

WALKER-TURNER CO., INC., PLAINFIELD, N. J.



METAL-CUTTING RADIAL MACHINE

Cutting wide, metal stock is easy with the Walker-Turner Metal-Cutting Radial Machine. Sliding ram design permits transverse travel of 21½". Geared motor—with saw shaft at bottom edge—permits deep cuts with smaller blades than in conventional motors and effects substantial savings in blade costs. Universal head makes mitering and compound mitering, as easy as straight cutting.

METAL-CUTTING BAND SAW

... profiling irregular dies... cutting sheets, rods and tubes of steel, iron, aluminum, brass, alloys and compositions—those are a few of the jobs Walker-Turner Metal-Cutting Band Saws are doing quickly, accurately, economically. Available in 14 and 16-inch models, these rugged, compact machines provide a speed range from 61 to 5300 a.f.m.



MACHINE TOOLS

DRILL PRESSES — HAND AND POWER FEED • RADIAL DRILLS
METAL-CUTTING BAND SAWS • POLISHING LATHES • FLEXIBLE SHAFT MACHINES
RADIAL CUT-OFF MACHINES FOR METAL • MOTORS • BELT & DISC SURFACERS

cating an SO or SW condition. An added disadvantage of the old method was that after the parts had been tested, the operator had to take a hammer and die and stamp each part both with his personal and a heat treat stamp certifying its true hardness.

With Vlcek's new Hardness Certifier, the testing and stamping operations are combined and the entire procedure is placed on an automatic, mechanical basis, completely removing all possibility of accidental error. The machine is set for the thickness of the material and the minimum satisfactory hardness—80 in the case of ST aluminum. Parts are then fed under the indenter point of the hardness tester unit which moves up and down at the rate of 43 times per minute. The machine could be geared faster or slower, but the 43 per minute rate has been found most satisfactory in practice.

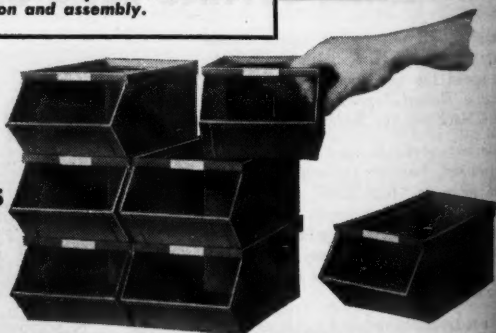
If the part measures up to the

specified hardness, an electrically-operated plunger automatically stamps it with both the inspector's and the hardness stamp. If it is too soft, the plunger remains inactive, and the part cannot possibly be certified. The entire operation is automatic, and could, in fact, be performed by a blind operator. Both the visual reading of the hardness tester dial and the hand stamping of parts are completely eliminated.

The Hardness Certifier, itself, consists of a flat-topped base member which serves as a working table on which the parts to be tested are placed, an upright support rigidly secured to the base and an arm supported by the upright which affords a mount for the stamp mechanism, comprising a plunger and an operating solenoid. The inspector's personal stamp and that indicating the material are removably secured in the plunger.

We have been given permission by WPB to manufacture Stackbins to be used as portable containers for production and assembly.

Save Time and Labor Handling Parts and Materials



Patented Stackbins keep parts and materials instantly accessible—eliminate waste hand motions—stack rigidly to form units

of exactly the right shape and capacity at the point of assembly—save time and labor handling parts and materials.

Write today for full details and prices on all-welded steel Stackbins.

STACKBIN CORP., 53 Troy St., Providence, R. I.

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"STACKED AND STILL ACCESSIBLE"

Points of interest
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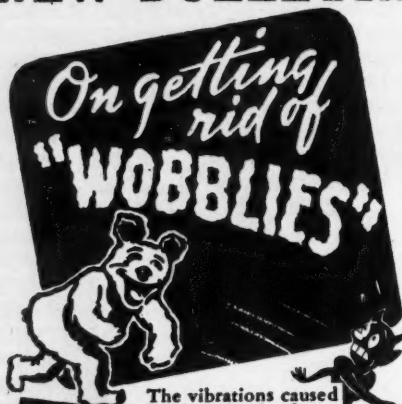
Abrasive RED BAND DIAMOND TOOLS

Abrasive
DRESSING TOOL COMPANY
Detroit, Michigan

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MODERN MACHINE SHOP 209

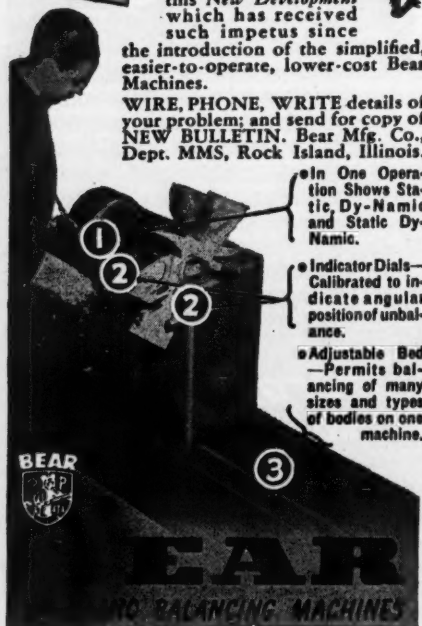
NEW BULLETIN



The vibrations caused by the couple-force action of Dy-Namic Unbalance in rotating parts is the *Unseen* and often *Undetected Enemy* of precision, efficiency and long life. The new Bear Bulletin brings you the facts about this *New Development* which has received such impetus since

the introduction of the simplified, easier-to-operate, lower-cost Bear Machines.

WIRE, PHONE, WRITE details of your problem; and send for copy of NEW BULLETIN. Bear Mfg. Co., Dept. MMS, Rock Island, Illinois.



1 In One Operation Shows Static, Dy-Namic and Static Dy-Namic.

2 Indicator Dials—Calibrated to indicate angular position of unbalance.

3 Adjustable Bed—Permits balancing of many sizes and types of bodies on one machine.



BEAR
DYNAMIC BALANCING MACHINES

Also mounted on the upright member is a bracket supporting the testing mechanism and the electric motor which operates it. This bracket can be raised and lowered from or toward the working surface by means of a screw and crank. A block mounted on the bracket carries bearing members, which in turn support a lever on a pin. This lever is urged upward by a strong spring to hold the follower against an eccentric driven by the electric motor which forces the indenter point of the hardness testing unit mounted on the other end of the lever into the material under test.

The hardness testing unit is of conventional form, comprising tester, indenter point and guard. Contacts are secured to the indicator structure and wired into an electrical circuit which includes a transformer connected to a source of power, a relay operated by the closing of the contacts which in turn closes other contacts, and a solenoid energized by the second set of contacts which actuates the stamping mechanism to mark the material.

Since the indenter point must be perpendicular to the material, an extension is included on the indenter pin which serves as a height gauge. This is so constructed that when the under surface of the extension is in contact with the material, the indenter point will be in the proper perpendicular position. The height gauge is adjusted by raising or lowering the bracket on which the testing mechanism is mounted.

In use, when quantities of similar parts are to be inspected, an edge of one part is placed under this extension and the gauge adjusted. The indenter point is then raised and lowered by the electric motor and the operator feeds in and removes the parts. If the part is up to the hardness for which the machine is set

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August, 1944



**RUGGED AND
DEPENDABLE**

HASKINS FLEXIBLE SHAFT UNITS ARE BUILT FOR SERVICE

They'll stand continuous hour after hour use—three shifts a day—seven days a week. They'll turn out more work—better work—faster and easier, with longer trouble-free operation. Use your Haskins Flexible Shaft Machines—use them hard. They won't let you down. Learn new ways of increasing production with flexible shaft equipment from Catalog 45. Write to R. G. Haskins Company, 619 So. California Ave., Chicago, Illinois.

HS-7



HASKINS
Flexible Shaft
EQUIPMENT

More **VERSATILE** Machines for
More **PROFITABLE** Work

the contacts close, operating the stamping mechanism but if the material is not of proper hardness, the contacts remain open.

The hardness tester unit is easily removed from the machine to replace a broken indenter point. The switch contact can be adjusted by spacing the contacts for various hardnesses. The impact of the stamp can be regulated by adjusting the soft iron armature within the solenoid. If an indenter point breaks, the machine will give a false reading, but as this is always a too soft reading, there is no danger of the machine certifying material due to a broken point.

Vlcek's original "Hardness Certifier" was built from scrap parts gathered from all parts of the plant. Several additional machines are now being built in the Martin Tool Manufacturing Dept. for use in the Martin plants, and licensing arrangements

have been established with the York Electric Tool Co., under which that company is now producing the "Hardness Certifier" for the commercial market.

"Qualities of a Good Boss," a 24-page practical self-rating booklet by Glenn Gardiner for persons in supervisory positions, is now being offered by the Elliott Service Co., 219 E. 44th St., New York, New York.

Placed in the hands of either a new or experienced foreman, this booklet will enable the reader to rate himself on the following phases of supervision: (1) knowledge of the job, (2) friendliness, (3) loyalty, (4) fairness, (5) appreciation, (6) instructing ability, (7) interest in safety, (8) consideration of others, (9) leadership or drivership, (10) control of temper, (11) foresight, (12) consistency, (13) open mindedness, (14) keeping promises, and (15) use of authority. At the end of the booklet is a score sheet whereby the foreman can obtain an overall picture of himself and determine his supervisory ability score.

CARBOLOY—TIPPED SCRAPERS

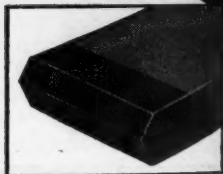
(TRADE MARK) CEMENTED CARBIDES

Work 10 times longer between sharpenings



Carboly-tipped scrapers speed up your scraping operations—eliminate all tendency to scratch or dig in—and last at least 10 times longer than steel scrapers. Only a few seconds required for reshaping, using a diamond wheel. No hand stoning required. In recent independent tests at a leading research institute, covering all materials scrapeable, Carboly-tipped scrapers averaged 75 sq. in. per sharpening as against 6½ sq. in. with steel scrapers.

For best results on rough and finish surface scraping, use Carboly-tipper scrapers. Write for folder A-100 and prices. Manufactured by



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YOU CAN'T AFFORD TO
MAKE *Your*
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TODAY YOU CAN BUY—

HURON ALL STEEL
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(Taper-Lock and Tri-Lock—Polished and Blackened or Plain)

FOR LESS THAN YOU CAN MAKE YOUR OWN!

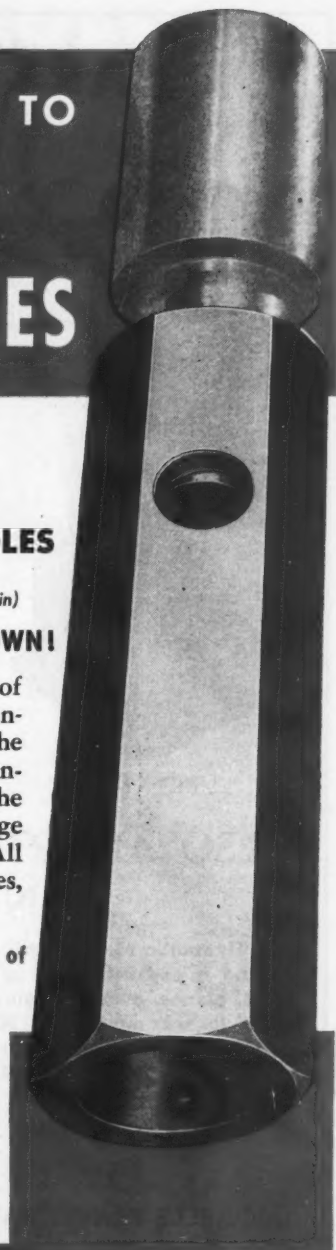
We are the largest exclusive manufacturers of gage handles in the country. Because of quantity production, our prices are positively the lowest in the trade—yet our quality is unsurpassed by any maker of gage handles in the industry. Most all nationally important gage manufacturers use HURON'S exclusively. All ten standard sizes. Write for literature, prices, discounts, etc.

And *Now* Huron also offers a complete range of
PLUG GAGE BLANKS

These are made of oil-hardened tool steel with the taper-shanks ground and the body rough turned .010 above the standard 1/16" steps.

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5355 Conner Ave. Detroit 13, Mich.



PART NUMBERS

LETTERING

GRADUATIONS

ROLLED

BY MACHINE

ON

FLAT *and* ROUND SURFACES

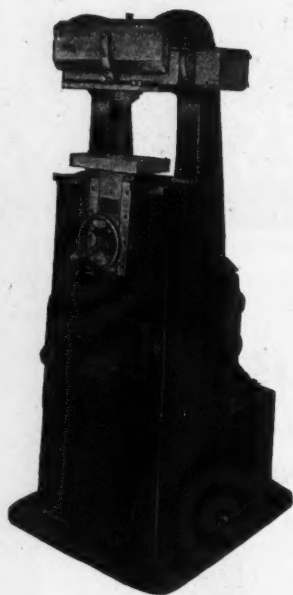
Sure - Fast - Accurate

OBSOLETES HAND STAMPING

SAVES [PARTS
LABOR
STAMPS

Eliminates POOR MARKING
ERROR — NOISE

Speeds . . . DELIVERIES



MODEL 173

ALSO ADAPTED TO CERTAIN KNURLING OPERATIONS

This Hydraulic Machine will mark piece parts quickly and accurately. It is serving in the war effort in many plants for marking components of guns, tanks, planes, motors, engines, shells, and practically every metal part produced for war equipment. Machine will mark unlimited number of sizes and shapes when equipped with proper tools and fixtures. It will also do an excellent knurling job on solids and shells of small diameters.

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GEO. T. SCHMIDT, INC.

1806 BELLE PLAINE AVENUE

CHICAGO 13, ILLINOIS

LIQUIDATED



for failure
to Comply!

"Failure to comply" means death for many during war time.

"Failure to comply" with the stringent demands of modern technological advancement means death for many manufacturing concerns during peace time. War is ruthless—so is competition.

Compliance with the quickened tempo of the times, the demand for improved products at lower cost and better and faster production is necessary. Yesterday's machines and methods are no good tomorrow. It is better to liquidate them now than to be liquidated by them later.

Welco engineers are prepared to plan with

you now the powering of your products to the tempo of tomorrow... to help make your products and methods more efficient — more dependable. All Welco Torque Motors are custom-built for a specific job. They make it possible to concentrate a specified amount of power in the smallest possible dimensions... enable the machine manufacturer to accomplish operations on his machines in less complicated, less costly and better appearing methods.

Manufacturers from all over America with difficult powering problems on their hands have made a beaten path to the doors of Welco. Their powering problems were solved.

What Is Your Powering Problem? . . . Write Today!

THE B. A. WESCHE ELECTRIC COMPANY

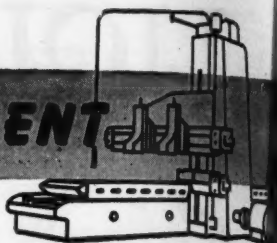
1628 VINE STREET

CINCINNATI 10, OHIO



★ **WELCO** ★

NEW SHOP EQUIPMENT



Norton Simplex Lapper

The Norton Simplex Lapper illustrated herewith, product of the Norton Company, Worcester 6, Mass., is designed for simultaneous finishing operations on one or several cylindrical surfaces. The machine is claimed to be especially desirable for finishing machine parts having cylindrical sections between shoulders.

Surface finishes as low as one micrometer RMS are said to be obtainable in a single quick, simple operation. One bearing or several on a workpiece can be finished in a fraction of a minute, it is claimed. Designed for versatile and quick-change operation, the Simplex can also be arranged to handle concentric and eccentric cylindrical portions at the same time, as well as

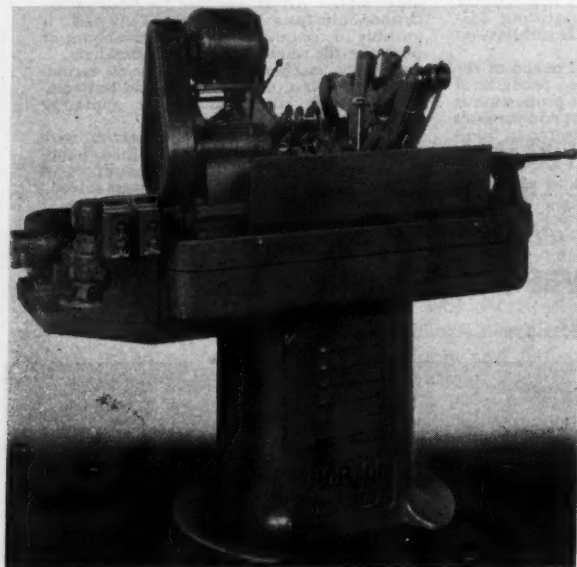
such sections as the pins of the short-throw cranks on compressors and the journals and eccentric members of small cam shafts.

The Norton Simplex Lapper has a capacity of from $\frac{1}{2}$ to 2 inches on diameters with lengths up to 24 inches. The machine makes use of abrasive-coated paper stripes which are scientifically and accurately applied to those surfaces on which reduced friction and initial wear are desired.

Wardwell No. 50F Automatic Universal Flute Grinder

The Wardwell No. 50F Automatic Universal Flute Grinder illustrated herewith, product of The Wardwell Mfg. Co., 3106 Fulton Rd., Cleveland 9, Ohio, is designed to grind flutes from solid in small tools such as reamers and taps. The machine can also be arranged for grinding side milling cutters and saws and for handling other classes of work.

The frame is a one piece casting and is very rigid in construction. All bearings of the machine are ball or bronze. Worms and gears operate in heavy oil. The grinding wheel head is made in two styles to suit the type of work to be done.



Norton Simplex Lapper

The No. 50F flute grinder is equipped with a long and unusually large grinding wheel spindle, mounted on high quality grease-seal ball bearings on one end and two Timken bearings on the other end which are adjustable and completely protected against dust and grit. The spindle is driven by V-belt from main shaft. The grinding wheel head is fitted to the frame in dovetail slides and is



Wardwell No. 50F Automatic Universal Flute Grinder

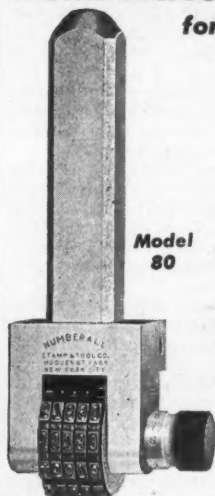
gibbed for adjustment. In grinding work, the wheel can be arranged with automatic feed and stop. The work holder is attached to an adjustable cross slide which is fitted to dovetail ways on the knee of the horizontal slide. The horizontal slide reciprocates under the grinding wheel on dovetail slides protected from dust and grit, and is gibbed to take up wear.

The reciprocating slide is operated by an eccentric which is adjustable for a stroke up to 5 inches. The eccentric shaft is provided with a clutch which can be instantly thrown in and out

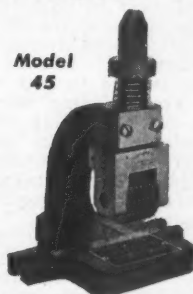
NUMBERALL

NUMBERING MACHINES

for stamping into metal, etc.



Model 80



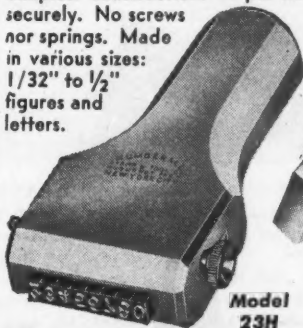
Model 45

Platform for stamping Name Plates and other small articles.

New, quick Set Machine. One wheel can be turned quickly by knurled knob for consecutive numbering.

Made in 1 to 20 wheels. Stamp in perfect alignment. Shank for Hand or Press Stamping.

Improved Type Holders, Hand or Press Style. Super Quality Steel Type. Type is easily, quickly, loaded and unloaded. Simplest construction. A pin holds the type securely. No screws nor springs. Made in various sizes: 1/32" to 1/2" figures and letters.



Model 23H



Steel Type

Write for Literature M57

NUMBERALL STAMP & TOOL CO.
HUGENOT PARK STATEN ISLAND 12, N. Y.

of connection for starting and stopping the movement of the slide when desired in making preliminary adjustments. The slide normally travels at a speed of 24 strokes per minute, but, can be speeded up to suit the work.

The work is automatically fed through an index plate which is fastened at one end of the work arbor. The knee on which the work arbor cross slide is mounted is adjustable to any part of the large horizontal slide so that the work can be arranged to suit the grinding wheel. The feed mechanism is also adjustable to suit the index plate.

For grinding spiral work or where a small grinding wheel is required, an independent high speed grinding unit is arranged on a shelf of the vertical slide. The unit can then be swiveled to any degree required for grinding the spiral work.

The Wardwell No. 50F Automatic Universal Flute Grinder has a capacity for reamers as small as 1/16 inch in diameter and saws up to 8 inches in diameter. The machine is supplied complete with one grinding wheel, one index plate, and spanner wrench. A diamond dresser mounted in fixture can be furnished on special order. The fixture, which is designed for fastening

to wheel guard and has a horizontal adjustment to the wheel, swings in line with the center of the spindle and is adjustable to any desired angle. A coolant pump can also be furnished on special order.

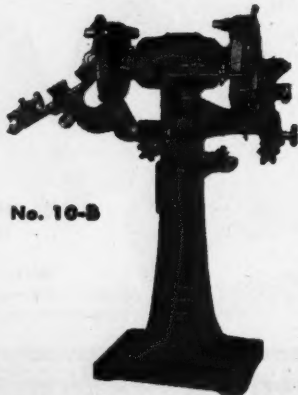
The machine occupies a floor space of 22 x 22 inches, is 56 inches high, has a net weight of 600 lb. and shipping weight of 675 pounds.

Monarch "Shape Master" Lathe

A shape-turning lathe which is designed to handle work up to 16 inches in diameter, to be known as the "Shape Master," is announced by The Monarch Machine Tool Co., Sidney, Ohio. Capable of performing the most intricate shaping and forming work, the machine makes possible the turning, boring, or facing of practically any desired shape. Molds, dies, punches, spinning chucks, and so on, are said to be machined with ease by means of the lathe.

The Shape Master mechanism consists of three elements. One controls the shape cut. Another regulates the

GRAND RAPIDS Combination Tap and Drill Grinder MOTOR DRIVEN



No. 10-B

SHARPENS TAPS No. 6 to 1½"
2-3-4 Flute, Right or Left
Hand.

SHARPENS DRILLS ⅛" to 1½"
2 or 3 Flute, Straight or
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Other Combinations also
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336 Straight Ave., S. W. • Grand Rapids 4, Mich.

Around the Globe

Snap-on Tools — THE CHOICE OF BETTER MECHANICS



Snap-on Tools
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WHEREVER America's armed forces fight, Snap-on tools are with them . . . as indispensable in mechanized war as guns and ammunition. In the hands of battalions of resourceful mechanics, Snap-ons are on the job . . . helping maintain in top fighting efficiency the vast fleets of planes, tanks and ships which they played an equally important part in building. Everywhere, Snap-ons are the choice of better mechanics. SNAP-ON TOOLS CORPORATION, 8032-H 28th Ave., Kenosha, Wis.

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MODERN MACHINE SHOP

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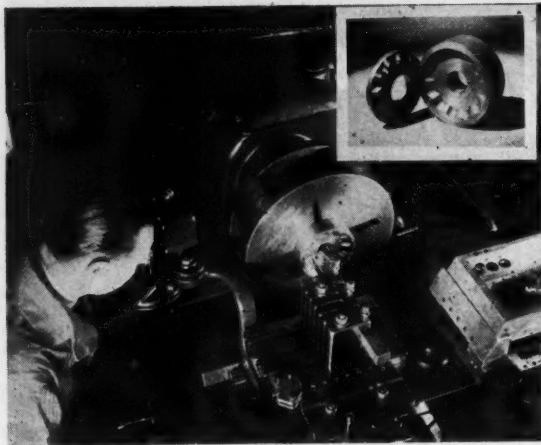


Illustration showing Monarch "Shape Master" Lathes being used to machine fluted dish mold

rate of repetition of the shape on any given circumference. A third controls the contour generated on successive diameters.

The tool-actuating mechanism, mounted on the carriage crossbridge in place of the usual compound rest, is cam-operated. A cam follower is linked

Repetition of the shape to be cut is determined by the geared relationship of cam and spindle revolutions. A single motor powers both the cam and spindle, and the machine is provided with sufficient change gears to afford a range up to 500 shapes or tool actuations per revolution of the work.

To Speed Victory! WE ARE READY TO SERVE YOU!

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Cold Pipe, Conduit and Tube Bending Machines

Twelve types to select from. Hand operated capacities $\frac{1}{4}$ to 6" inclusive. Motor operated $\frac{1}{2}$ to 8" inclusive.

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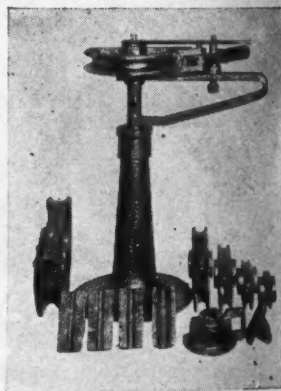
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"**American**"

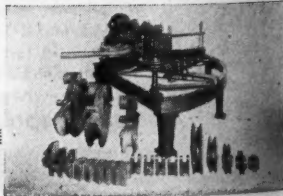
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August, 1944

*Conserves energy...
increases production*

SIoux

DIRECT DRIVE FLEXIBLE SHAFT



Smooth, efficient, speedy in operation, especially on grinding, sanding, polishing, finishing, etc. Turns out finest grade of work quickly.

Light, compact, easy to handle. Portable for greater utility. Built for long, hard service.

Its flexibility makes difficult places to reach, easily accessible.

Ask Your SIoux Distributor or write us.

No. 1020 1/2 H. P. stationary motor, 1725 R. P. M. Ideal for Tire Shops with attachments shown above.



No. 1009 1/2 H. P. or No. 1027 3/4 H. P. motor which swivels and tilts. Especially designed for Body Shop sanding and grinding (see photo at right).



STANDARD THE

WILKINSON & CO., INC.



WORLD OVER

SIoux CITY, IOWA, U.S.A.

The Shape Master further simplifies the complicated work of shape generation by making its own master record cams. Provision has been made whereby a simple motor-driven cutting head can be substituted for the cam follower. An enlarged template of the section desired (only a segment is needed in the case of a symmetrical form) is then chucked and a stylus or follower is substituted for the tool. The chuck is slowly rotated, and the machine "works in reverse" to cut its own cam.

The overall contour of the work can be controlled in two ways. A stroke-compensating device enables the same shape to be maintained over a constantly increasing or decreasing diameter of the workpiece. Irregular contours can be obtained by the use of a metal template in conjunction with Keller electrical control.

Reliance Electronic V*S Drive

An electronic system of adjustable speed drive which is operated from the regular polyphase a. c. distribution system—220, 440 or 550 volt, two or three

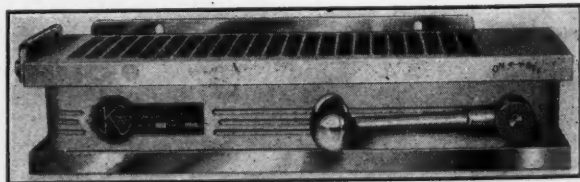
phase, 25, 50 or 60 cycle—to provide speed ranges of 20 to 1 is announced by The Reliance Electric & Engineering Co., 1088 Ivanhoe Rd., Cleveland 10, Ohio. Where the actual motor is light, as in machine tool feed applications, a substantially wider range of operating speeds can be obtained.

The Reliance Electronic V*S Drive, as it is known, is available in 1, 1½, 2, 3 and 5 h. p. sizes and is designed to provide controlled starting torque and controlled torque for braking and stopping. Physically, the drive consists of a small cabinet housing the necessary tubes and transformers; a motor which is connected to the load; and a "start-stop-and-reverse" push-button station in which has also been incorporated the speed-changing rheostat.

The functioning of the electronic system of V*S drive is based on voltage control. Referring to the accompanying illustration, the transformer which steps down the voltage of the a. c. supply for the anode circuit of the rectifier tubes is mounted by itself in the base of the cabinet.

The front of the cabinet is made up of three panels. One (at upper right) carries the excitation tube, all control tubes and transformers, a tap switch

KAR Permanent Magnet CHUCKS



Cannot Fail
Hold Work Tight
Generate No Heat

An outstanding and exclusive advantage of the KAR Permanent Magnet Chuck is its ability to hold smaller pieces securely due to the close spacing of the pole pieces.

Release easily
Used Wet or Dry
Use No Power



THE KAR ENGINEERING CO., Inc.
GREAT BARRINGTON MASSACHUSETTS

Do YOUR BURS GALLOP...



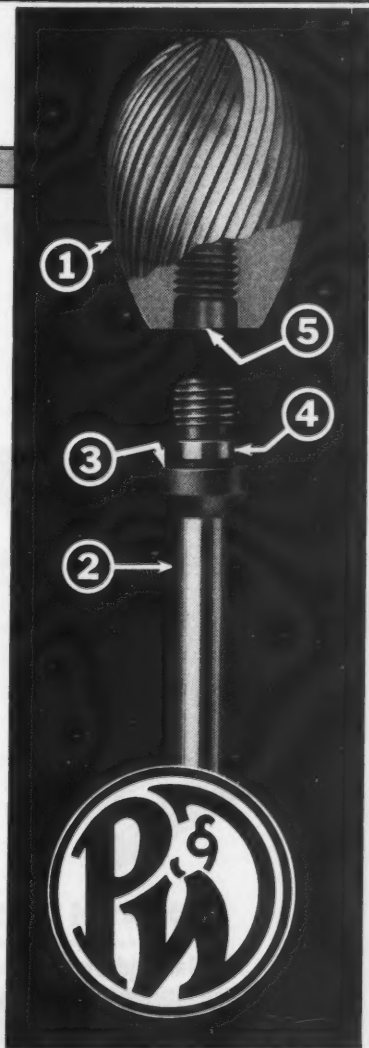
OR ROLL?



A bur that is even slightly out of balance will "gallop," leaving ripples and ridges in the work. To reach a smooth finish, the operator must bear down harder, and make several additional passes across the work. This increases fatigue, requires more time per piece, cuts down production.

There is no need for your burs to gallop — if they are accurately made, and are mounted upon properly designed precision-ground arbors. (1) shows a Pratt & Whitney bur . . . ground from solid on a special machine designed for the purpose. Human error — found in the common garden-variety of hand-ground bur — is automatically removed. (2) is a Pratt & Whitney precision arbor which can be supplied for P&W burs having $\frac{5}{16}$ " thread and larger. The shank surface (2), the pilot diameter (4) and the shoulder surface (3) are all ground on centers to run true and square. The reamed hole (5) takes the ground pilot (4) while the threads pull the ground surface (3) up against the bottom surface of the bur which is square with the reamed hole (5). The threads, a loose fit, have no influence on the final position of the bur on the arbor. Result . . . a precision combination of bur and arbor that is so true and perfectly balanced that it ROLLS across the work, like a milling cutter — taking a deep bite all the way.

Try Pratt & Whitney Kellerflex Burs on your next order.



PRATT & WHITNEY

Division NILES-BEMENT-POND COMPANY
KELLERFLEX SALES DIVISION
WEST HARTFORD 1, CONN.

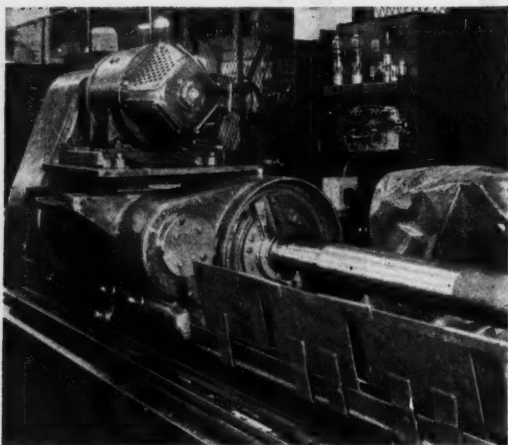


Illustration Showing Reliance Electronic V'S Drive Installed on Grinder

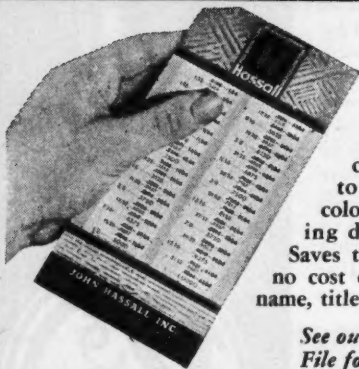
for matching a. c. voltage, and four factory preset rheostats which establish (1) maximum and (2) minimum motor operating speeds, (3) fix the value of I. R. drop compensation, and (4) determine the degree of starting acceleration to be permitted the motor. A 45-second warm-up timer is also mounted

on this panel directly above the excitation tube.

A second or power panel (at upper left) carries two, three or four grid-control tubes (for converting alternating to direct current) and their filament transformers. The single-phase panel up to and including 2 h.p. has two tubes rated at 6.4 amperes. The h. p. unit is three-phase and uses three of the same tubes, while the 5 h. p. unit uses four tubes.

The third or control panel across the bottom of the cabinet front carries all necessary contractors, relays, and so on.

for starting, stopping, reversing, dynamic braking, jogging, and other desired operating functions. All panels are arranged with individual terminal boards for ease and speed of wiring in individual groups of controls. Cable or harness-type industrial wiring is used throughout.



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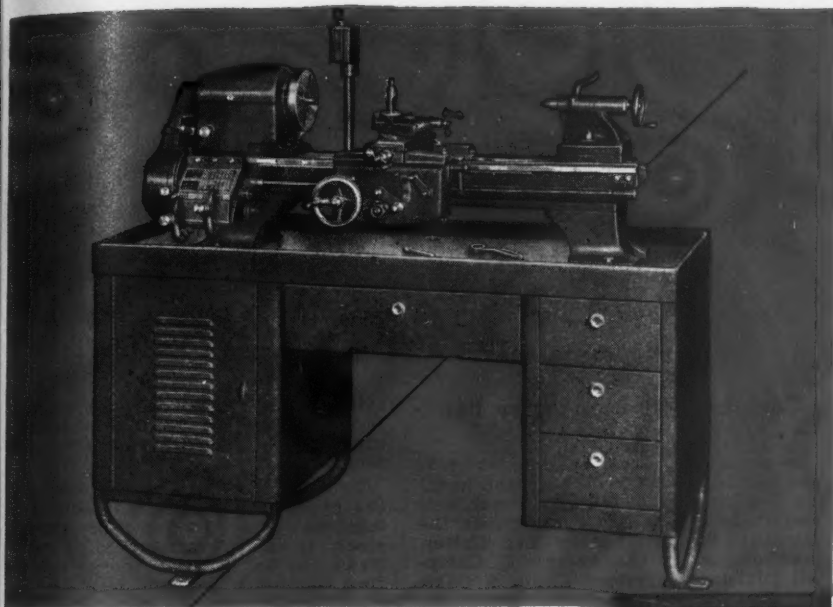


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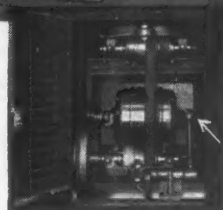
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Logan Presents **NEW QUICK CHANGE GEAR CABINET LATHE** *With Automatic Apron*

The Logan Cabinet Lathe is adaptable to tool room work, for maintenance, training, or production. It is built for durability to standards of precision outstanding in its field. The carriage with friction-feed automatic apron travels over a rugged bed ground to within .0005" of absolute accuracy. Total run-out of headstock spindle 12 inches from the bearing is less than .001". Lead screw is held to within .002" in 12 inches. Precision preloaded ball bearing headstock and self lubricating bronze bearings at 40 vital points minimize friction. Strong steel cabinet has four drawers. Left hand compartment contains underneath motor drive and countershaft. 3-point base makes it steady on any floor. All moving belts and gears enclosed. Write for catalog information.



UNDERNEATH DRIVE: Completely self contained and enclosed in left compartment of cabinet. For easy, safe belt changing, the lever (indicated by white arrow) is pulled outward to release flat belt tension. Adjustments of both flat belt and V-belt tensions are easy to reach. Multiple V-Belt Drive transmits power from cone pulley to spindle.

BRIEF SPECIFICATIONS: Swing over bed, 10½" . . . bed length, 43⅛" . . . spindle hole, ⅝" . . . precision ground ways; 2 prismatic V-ways; 2 flat ways . . . 12 spindle speeds, 30 to 1450 r.p.m. . . . worm drive from lead screw spindle for power feeds . . . friction clutch on power feeds . . . longitudinal feed .0015" to .1000" per spindle revolution . . . cross feed .25 times longitudinal feed . . . half nut drive from lead screw for thread cutting . . . Threads, 48 selections RH or LH, 4 to 224 per inch.

Logan

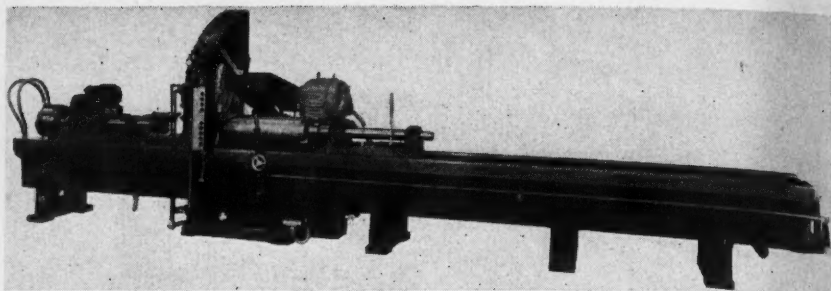
LOGAN ENGINEERING CO.
CHICAGO 30, ILLINOIS

A NAME TO REMEMBER WHEN YOU THINK OF LATHES

August, 1944

August, 1944

MODERN MACHINE SHOP 225



Campbell No. 510 Rotary Bar Cutter

Campbell No. 510 Rotary Bar Cutter

An abrasive cutting machine which is designed to cut round, square and hexagonal bar stock of steel, aluminum, and nonferrous alloys, to be known as the Campbell No. 510 Rotary Bar Cutter, is announced by the Andrew C. Campbell Division, American Chain & Cable Co., Inc., Bridgeport, Conn. Controlled from a single station, the machine is arranged so that the bar stock is ro-

tated as the abrasive wheel oscillates. Work is said to be cut so smoothly that further finishing for extruding or forging is unnecessary.

To cut a bar, the operator first moves the hydraulically operated table of the machine into position for chucking stock in air-operated holding device. Next, the bar stock is moved into cutting position by a hand lever, the carriage being mounted on roller bearings so as to require a minimum of effort to operate. The bar is now rotated and



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There's no guesswork when your jigs are equipped with Acme Bushings. On the contrary, accurate drilling is assured, because drill jig bushings from Acme are produced by specialists in precision manufacture.

Acme offers two complete bushing standards, the A.S.A., plus the Acme standard line. Because of this you may be enabled to eliminate many special bushing requirements to save time and money.

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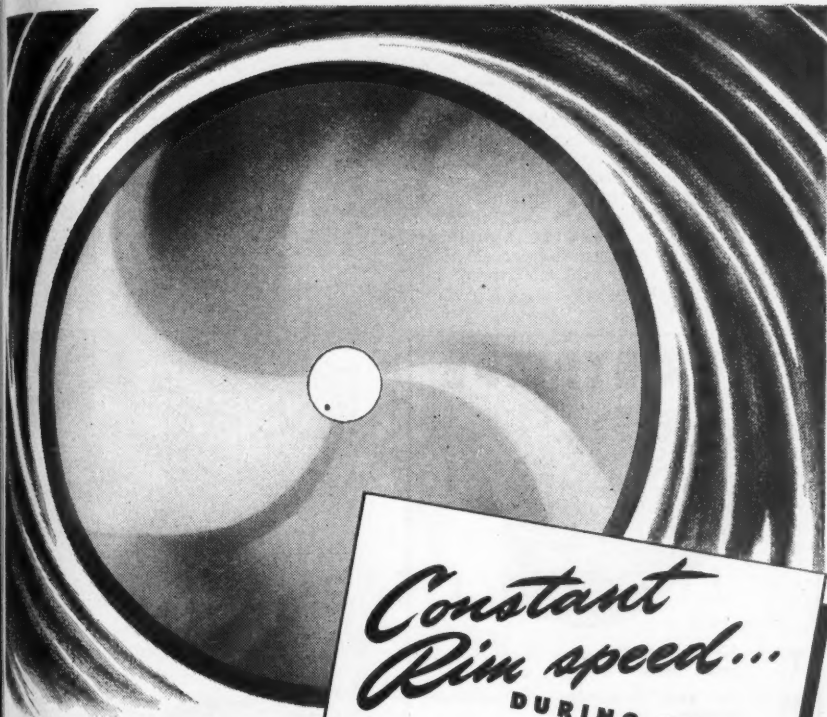
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*Constant
Rim speed...*

**DURING ENTIRE
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DI-MET DIAMOND WHEELS

DI-MET Diamond Wheels give you fast cutting, efficient service on all grinding and cutting-off operations where use of diamond wheels are practical* because rim speeds show negligible change during entire wheel life. Grinders with fixed spindle speeds, therefore, maintain their full efficiency from the time the wheel goes on the machine until its long, useful life is ended.

This slow-wearing rim has other advantages too—it makes precision easier to maintain from end to end on cylindrical or surface grinding. It simplifies obtaining uniform dimensions on multiple-toothed cutters without time wasted for individually indicating cutter teeth or for making constant machine infeed adjustments to compensate for wheel wear.

DI-MET Diamond Wheels lower down time for tool maintenance, cut fast and free, will not craze fragile carbide surfaces, produce much sharper cutting edges than ordinary abrasives. Our catalog shows prices and sizes of all standard **DI-MET** wheel types—write for your free copy without delay!

FELKER MANUFACTURING CO.
1119 BORDER AVENUE, TORRANCE, CALIFORNIA

Resinoid Bond



Metal Bond



Rimlock
Type CR



***DI-MET DIAMOND WHEELS ARE MADE IN 3 BONDS:**
RESINOID BOND—for rapid grinding and cutting-off on all types of sintered carbides.

METAL BOND—for grinding all types of sintered carbides and non-metallic materials with exceptionally long wheel life and ability to hold rim shape.

RIMLOCK & TYPE CR—for cutting off, grooving and milling non-metallic materials such as glass, porcelain, quartz, clay products, vitrified materials, asbestos-cement, concrete, other similar substances.



MANUFACTURERS OF DIAMOND ABRASIVE WHEELS

MODERN MACHINE SHOP 227

cut to within $\frac{3}{4}$ inch of center, leaving sufficient stock to support the bar while the rotating cut is being made. Rotation is then stopped, and hydraulic jacks are moved upward to support the bar for cutting the center section. Finally, the hydraulic table is operated so as to move the cut piece out into position for unloading.

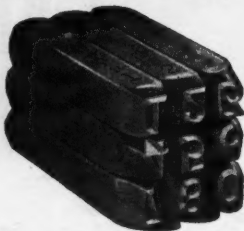
Specifications of the Campbell No. 510 Rotary Bar Cutter are as follows: capacity, 12-inch diameter aluminium bars and $7\frac{1}{2}$ -inch diameter steel bars; spindle speeds, 1,750 and 2,500 r. p. m.; wheel thicknesses, 0.125 and 0.150 inch;

wheel diameter, 20 inches; motor, 25 h. p. ball bearing; floor space, 64 inches x 26 feet; height, 74 inches; net weight, 15,000 pounds.

DoAll Butt Welder

The DoAll Butt Welder now being offered by Continental Machines, Inc., 1306 Washington Ave., South, Minneapolis 4, Minn., can be used for joining all types of band saws in widths up to

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T is for the TOUGH alloy steel used to make them.
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Send for samples—today.

The Pittsburgh Stamp Co.

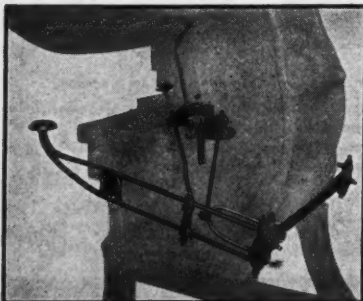
812 CANAL ST. • PITTSBURGH, PA.



DoAll Table Model Butt Welder

$1\frac{1}{4}$ inches; also, for welding extensions to small tools, salvaging broken tools, and for small miscellaneous welding operations.

With the butt welder, steel rods, steel tape, wire and wire forms up to $\frac{3}{4}$ inch in diameter can be quickly welded. Ex-



SAFETY EQUIPMENT FOR POWER AND FOOT PRESSES

Combination Gate and Barrier Guards
 Two-Hand Safety Starting Devices
 Sweep Guards... Single-Stroke Attachments
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64 inches
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August, 1944



*Every Size
Every Type
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**PUTNAM SHELL END MILL
CAN BE SHIPPED IMMEDIATELY
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Complete assortments of Putnam High Speed Heavy Duty End Mills from 1 1/4" to 6" in diameter are on dealers' shelves and here at the factory. We can fill your requirements immediately from stock. In no case will it take more than 48 hours after the order reaches us for Shell End Mills to be delivered to you.

Remember that all of the 761 items in the Putnam line are carried in stock for immediate shipment. For quality End Mills, Chucking Reamers and Counterbores that "cut faster and last longer" write, or, if necessary, wire or phone, to the nearest Putnam distributor or representative or directly to the factory. Complete information and price list will be sent on request.



PUTNAM TOOL COMPANY

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Detroit 7, Michigan

tension to drills, screw drivers, small grinding wheels, reamers, and other cutting tools can be quickly made to order by means of the welder, which is completely automatic and can be easily operated by unskilled workers with a minimum of instruction.

Operation of the DoAll Butt Welder consists of four simple steps which assure precision welding: (1) inserting and clamping work in welder jaws, (2) pressing welding switch, (3) pressing annealing switch, and (4) dressing off weld flash. Facilities for performing all of these operations are provided on the butt welding unit. According to the manufacturer, no adjustments are necessary for producing different size saw or tool welds.

An electric etching attachment which is said to be ideal for the quick marking of tools, templates, parts, and so on, is available for operation with the butt welder. The attachment is clamped to one of the welding jaws and marking is done with an etching pencil provided.

The DoAll Butt Welder is available in a table model for portability and a pedestal model containing storage space for coiled band saw or other stock. Both models have the same capacity.

Norelco Electronic Searchray Model 150

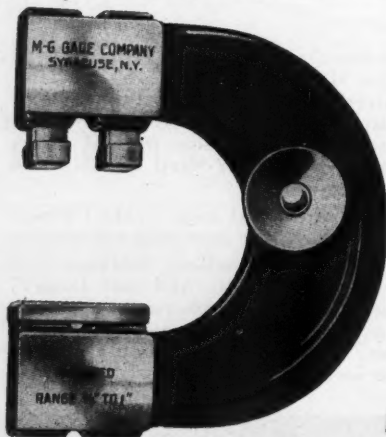
Designated as the Norelco Electronic Searchray Model 150, a self-contained industrial X-ray unit for the internal inspection of castings, parts, assemblies, and so on, for flaws, defects, or foreign matter is announced by North American Philips Co., Inc., 100 E. 42nd St., New York 17, New York.

Construction features include oil-immersed water-cooled X-ray tube; automatic switch to protect tube from overheating; lead-lined specimen compartment with easily operated door; interlock safety switch to protect operator from x-radiation; fluoroscopic viewing device for positioning specimen; cassette tunnel for use in making radiograph after object is in position; built-in cabinet for storage of exposed and unexposed film holders and cassettes; push button for fluoroscopic use; retractable eyepiece for fluoroscopic examination; lamp to indicate when X-ray tube is in operation; stepless kilovoltage selector with three direct-reading penetration scales; electric timer with range from 1 to 20 minutes in 10-second intervals; variable milliamperage con-

Adjustable Limit Snap Gage Specialists For 28 Years

Exclusive Features

1. Patented locking device, adjusting and locking means completely housed within the head.
2. Square shanks on pins and anvils to prevent turning in the holes.
3. Light weight but very strong frame to give user a better sense of feel on his work.



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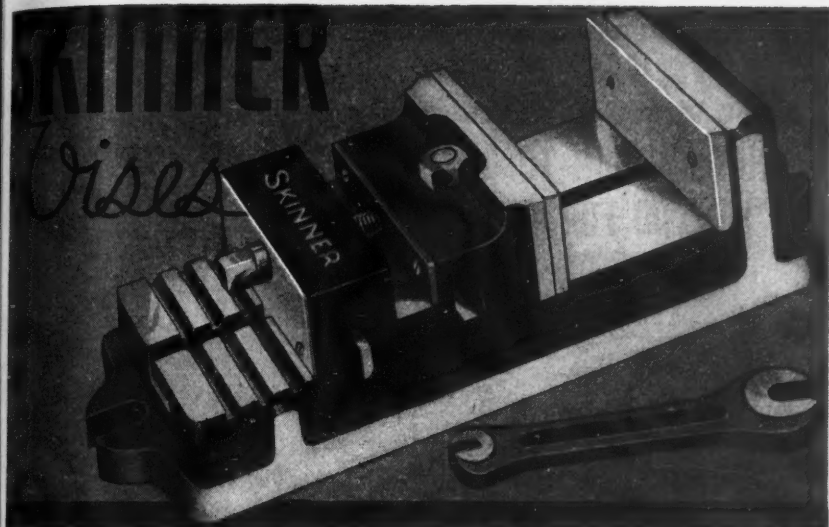
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August, 1944



Save Time AT THE DRILL PRESS

This sturdy quick-acting accurately machined vise is designed for all around work on Drill Presses. Clamp the work for all drilling in one plane; drill; then turn this vise on edge for a second operation in a plane at right angles — without reclamping. Available in 2½, 3½, 4½, 5½ and 7½ inch sizes. Write for catalog giving prices and dimensions.

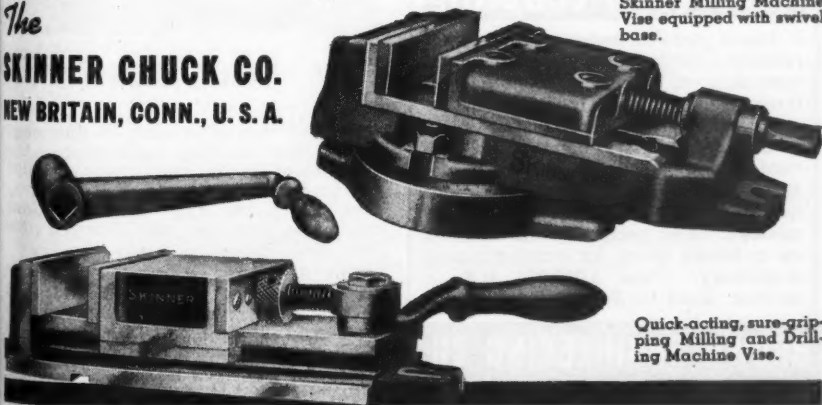
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The

SKINNER CHUCK CO.
NEW BRITAIN, CONN., U. S. A.

Skinner Milling Machine
Vise equipped with swivel
base.



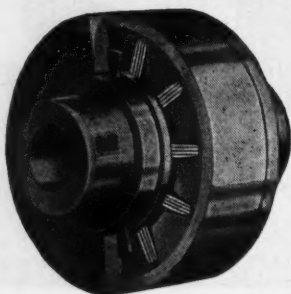
Quick-acting, sure-grip-
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ing Machine Vise.

August, 1944

MODERN MACHINE SHOP 231

LOOK---

WHAT CUSHION TORQUE WILL DO FOR YOU



If you want steady, uninterrupted production—lower machine-repair costs and freedom from misalignment troubles, take advantage of the long-lived CUSHION TORQUE developed by the KANTI-LEVER COUPLING. It not only protects you against misalignment like the ordinary coupling, but it goes several steps further and cushions your Motors and Productive Machines against the wear, vibration and fatigue that are the source of most machine failures. No other coupling is like the—

Kanti-lever Coupling

It has a circular series of laminated, resilient Cantilevers of 200,000 lb. steel operating in taper-side slots. End thrust is impossible: leverage on the cantilevers decreases automatically with increased load: safety stops prevent damage from extreme overloads: special end-float obtainable up to four inches without increase in cantilever stresses: outer periphery can be used as a brake drum for quick-stopping machinery. Over 3,000,000 H.P. in service. Send for Bulletin No. 28-M.

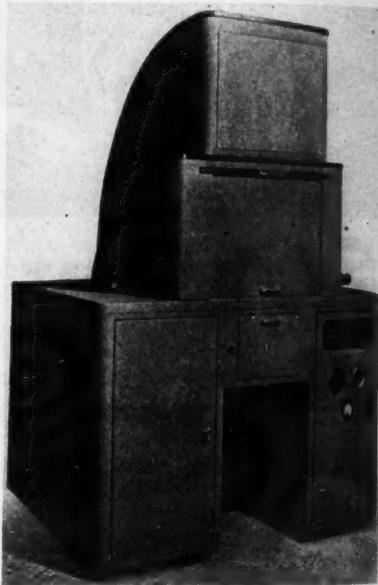
BROWN ENGINEERING CO.

120 N. THIRD ST. READING, PA.

trol. with range from 50 to 10 ma.; and so on.

The Norelco Electronic Searchray Model 150 can be readily installed by simply placing in desired location and connecting to 220-volt 60-cycle single-phase a. c. power supply. Easy to operate, the unit is said to be rayproof and shockproof, with all adjustments and operations made from one position.

For non-destructive internal examination, the object is placed in specimen compartment where it can then be posi-



Norelco Electronic Searchray Model 150
Industrial X-Ray Unit

tioned by means of built-in fluoroscopic screen for making radiograph. After the object is in the desired position, the proper kilovoltage is selected (stepless, 20 to 150 kvp) from direct-reading scale and the film inserted, timer set, and exposure made.

The Searchray Model 150 is 85 inches high x 59 inches wide x 52 inches deep. The specimen compartment is 16 inches high x 36 inches wide x 21 inches deep. Net weight of the unit is approximately 1,200 lb.; shipping weight, approximately 1,750 pounds.

FACTS YOU SHOULD KNOW

about

HARD *Chromium Plating*

Chromium electroplating was first accomplished by Bunson in 1854, while Geuther in 1856 succeeded in electroplating with chromium from a chromic acid solution which is the method in general use today.

Until 1935 chromium plate was principally used as a decorative coating. This coating was very thin (.00002") and was used on many articles because it retained its lustrous beauty by resisting tarnish.

Not until we entered the war did "hard" chromium plating become an important factor in the tool industry, for it was quickly discovered that coatings from .0002" to .05" thick would conserve steel by greatly increasing the life of hand and machine tools and make fabricated parts last longer.

Most industrial coatings of chromium plate were found to have a value of 1000 Brinell with No. 9 position on the Mohs scale, with the diamond as No. 10. This extreme hardness was found to outlast the wearing qualities of hardened steel gages by 5 times.

That is why all Ellstrom made gage blocks are chromium plated on their gaging surfaces—to give them wearing qualities that will outlast the life of the ordinary hard steel blocks.

By actual test Ellstrom standards will last 2 to 5 times longer.



This is number one in a series of articles by the Dearborn Gage Company on chromium plating.

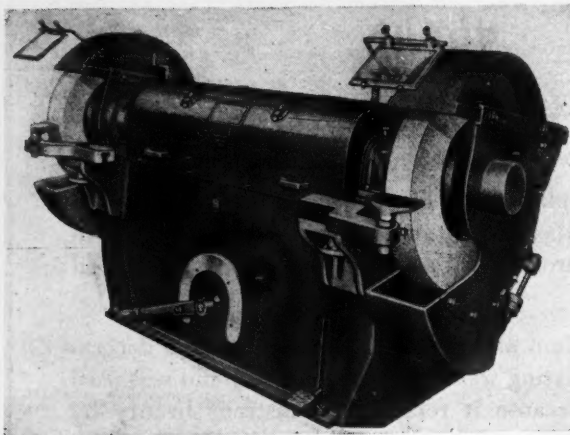


DEARBORN GAGE CO.

22035 BEECH STREET
DEARBORN, MICHIGAN



Originators of Chromium Plated Gage Blocks



United States Model 69 Gear-Driven Multi-Speed Snagging Grinder

United States Model 69 Gear-Driven Multi-Speed Snagging Grinder

Production of a gear-driven snagging grinder in speeds to suit all types of heavy duty grinding is announced by

peripheral speeds of grinding wheels for the full life of the wheels. The speed lever is interlocked with wheel guards so that spindle speed cannot be increased unless grinding wheels are worn down sufficiently to justify speed change. In addition, the electric interlock is said

The United States Electrical Tool Co., Cincinnati, Ohio. Designated as the Model 69, the machine is available with 33 or 40 h. p., standard N. E. M. A. frame, totally-enclosed, fan-cooled motor.

Spindle speed is variable by means of foot pedal and lever through semi-enclosed constantly lubricated reduction gears — a construction which is said to enable operator to maintain

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DOWEL • STRAIGHT • COUNTERSUNK • ANGLE ENDS
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PRECISION TAPER PINS

DIAMETER UP TO .125" — LENGTH UP TO 1"
HARDENED AND GROUND
TAPER TOLERANCE .0001" IN LENGTH OF PIN
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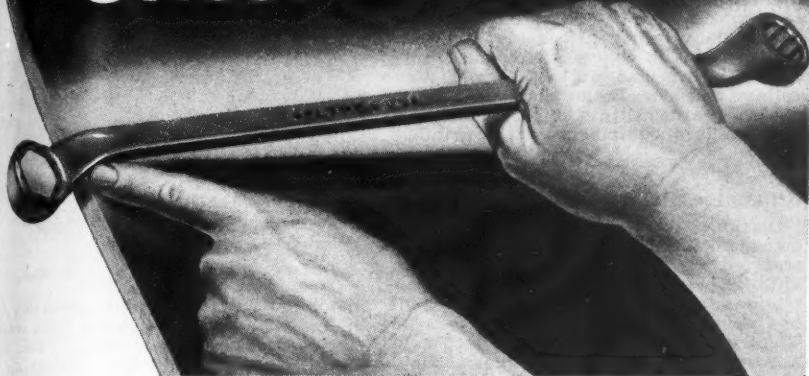
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CLEVELAND 3, OHIO

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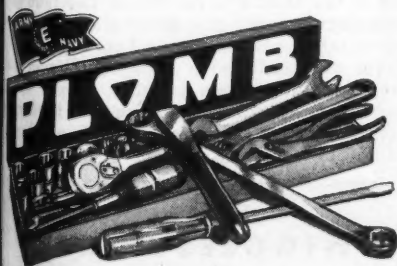


for better clearance

Here's one of the many Plomb Tools speeding war work. It represents the most compact line of Offset Box Wrenches on the market — covering the greatest number of opening sizes with the minimum number of wrenches — available in both long and short types. . . . Features like this make Plomb Tools the choice of professional mechanics in all

industries. You will find the tools you need at Plomb dealers, everywhere. —

Plomb Tool Company
Los Angeles, Calif.



FINE HAND TOOLS FOR ALL INDUSTRIES

MODERN MACHINE SHOP 235

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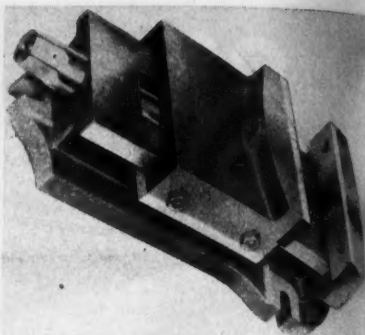
to prevent operation of the machine unless gears are in mesh.

The one-piece chrome manganese steel grinding wheel spindle is supported by four heavy duty ball bearings which are enclosed in a dustproof housing having labyrinth seals inside and out. The machine is controlled by push button with overload protection and low-voltage release. Boiler plate adjustable wheels guards with exhaust connections are standard equipment of the grinder.

Rouselle Stationary Victory Vise

Designed to meet wartime production demands for a heavy, accurately constructed vise for holding work during milling, grinding, cutting, and so on, a stationary type vise of rugged design has been added to the line of Rouselle Victory Vises produced by the David J. Ross Co., Benton Harbor, Mich. Available in four sizes of 4½, 7, 10 and 13 inches, the vise features an extra heavy base and ways together with extra-strength locking screw.

According to the manufacturer, the Rouselle Stationary Victory Vise has unusual resistance to tool pressure and

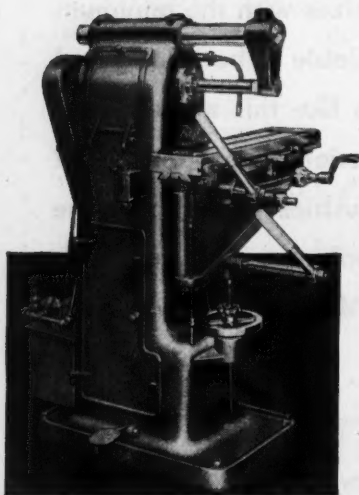


Rouselle Stationary Victory Vise

machine vibration, thus providing for increased accuracy of work with resultant decrease in rejections. The vise is designed for quickly setting up to meet various work requirements, wide clearance being provided at the end of the locking screw to allow for easy use of wrench in locking jaws. A unique cleanout hole in the base of the stationary jaw permits chips and waste accumulation to be removed.

Small Parts **MILLER**

With Added Power Longitudinal Feed



**BUILT-IN ACCURACY
1 H.P. MOTOR-IN-BASE DRIVE
TIMKEN BEARING SPINDLE**

The No. 3 WIGGLESWORTH MILLER produces a fine finish, free from chatter marks on small parts within its range. Particularly adaptable to the manufacture of small arms parts.

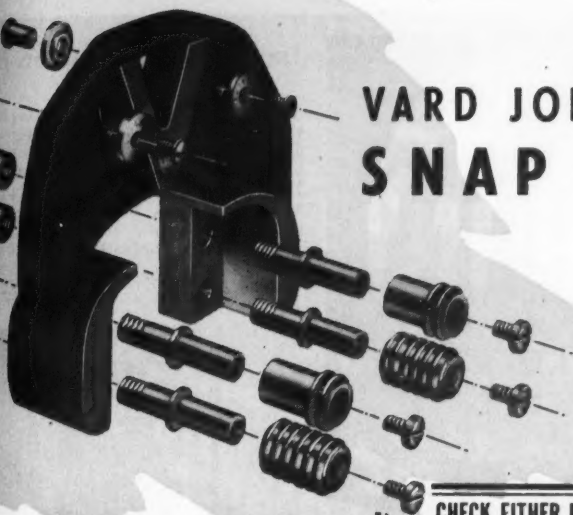
Drive is through a pair of 45° angle spiral gears in the saddle to the worm. The feed gear mechanism consists of a set of planetary gears. Drive to table is taken from a 3-step cone pulley on rear of spindle to a 3-step pulley in feed shaft. Planetary gears provide proper speed reduction to spindle to give proper feed rate to table. Six spindle speeds are obtainable from 150 to 800 r.p.m.

IMMEDIATE DELIVERY WITH HIGH PRIORITY

Write for complete folder.

**WIGGLESWORTH
MACHINE TOOL CO. 191 BENTLEY
CAMBRIDGE, MASS.**

VARD JOHN-SONS SNAP GAGE



CHECK EITHER RIGHT OR LEFT HAND THREADS WITH THE SAME GAGE.

- Rotating rolls reduce wear.
- Eccentric pins permit adjustment.
- Meehanite, hand fitting frame.
- Open end gage frame permits checking threads to a shoulder.
- Lock nuts secure gage setting.

VARD JOHN-SONS ROLL THREAD SNAP GAGES
ARE MADE IN SIZES TO GAGE WORK FROM
NO. 0 TO 12-IN. DIAMETER, AND IN ALL
STANDARD THREAD FORMS.



This is an exploded view of a VARD precision thread gage. This gage can explode your inspection costs if you are still checking external threads with a pair of ring gages.

In one quick operation, threaded work on the bench or the machine can be gaged for lead, thread form, pitch diameter, straightness and roundness.

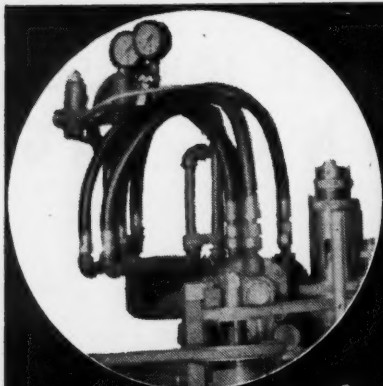
Correctly cut threads pass through the GO rolls—are stopped by the NO GO rolls.

Write for literature today.



VARD INC.

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*Limber as a
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**STRONG as
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Norgren Hose Assemblies are outstanding for extreme flexibility and pressure-tightness. They've got the "stuff" to give service day after day, year after year—cut maintenance and replacements to a new low in your factory!

Maximum resistance to oil, heat, cold, and vibration. Permanent machined couplings and steel-wire reinforced hose for high pressures. Replaceable couplings for low pressures. Write for complete data, giving your specifications. C. A. Norgren Company, Denver 9, Colorado.

Norgren

Dayton Rogers Cushion Blanking Die

A cushion blanking die especially designed for producing custom-made flat die-cut stampings on a semi-production basis is announced by the Dayton Rogers Mfg. Co., 2849 12th Ave., South, Minneapolis 7, Minn. The accompanying illustration indicates manner in which die is installed in press and how it functions.

Referring to the illustration, the

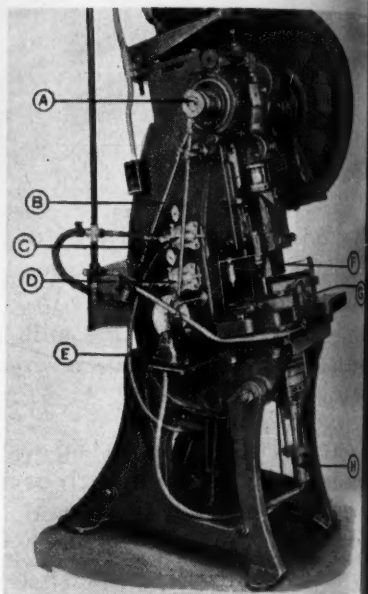


Illustration showing press setup for producing die-cut blanks with Dayton Rogers Cushion Blanking Die

special sub-bolster plate G is designed to accommodate blanking punches from $\frac{1}{8}$ to $\frac{1}{2}$ inch thick. Special hardened and ground stripping pins are nested around the blanking punch and pass through the universal sub-bolster plate G. The pins are controlled for stripping action by standard pneumatic cushion fastened to the press bed frame. The blanking die is supported by stripping pin made of stock $\frac{1}{8}$ to $\frac{1}{2}$ inch thick, and is brought into blanking action by the special hardened and ground pressure punch pad F.

Two cams fastened to the punch press

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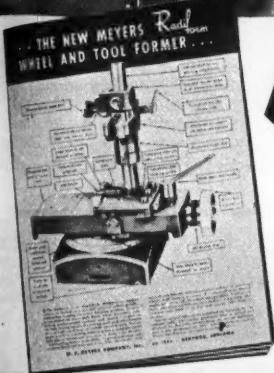
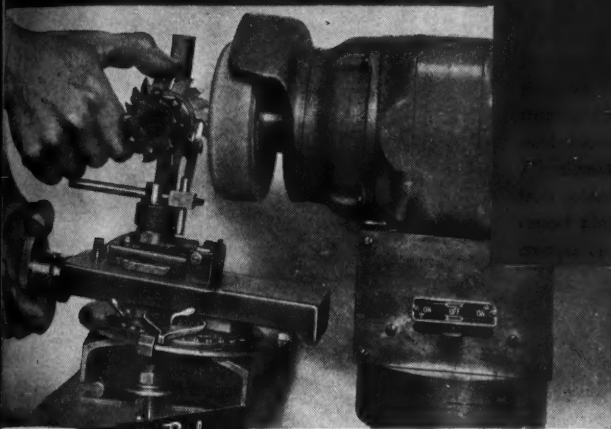
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August, 1944

MACHINE TOOL MIRACLE

Radiform

TRADE MARK REG.



PAT.
PENDING

FREE . . . Illustrated Catalog and Operator's Manual

Actually a valuable text book on tool forming methods. Contains complete step-by-step operating instructions for forming carbide tipped as well as high speed steel tools directly against wheel—including precision radii on spiral fluted end mills and drills. No machine shop should be without this valuable guide. Write for free copy.

Write for copy

crank A control the two valve rods B and C which, in turn, open and close two air valves designated as E. Combination pressure gage and regulator enables the operator to increase or decrease the air pressure required on the pneumatic die cushion, including the smaller air cylinder H which operates an ejector that removes the blanks from the die after they are punched free from same. Die-cut blanks from 0.005 to $\frac{1}{8}$ inch can, it is claimed, be produced in a satisfactory manner on the press equipment as shown.

WALTHAM

Sub-Presses Reduces Hand Finishing



Available in arch and overhanging types in 10 diameters up to 6".

Alignment is attained for precision and clean work.

Lower costs through savings in time and effort.

Send sample or drawings for estimate and get our booklet explaining how and when Sub-Presses should be used.

WRITE TODAY FOR YOUR COPY.

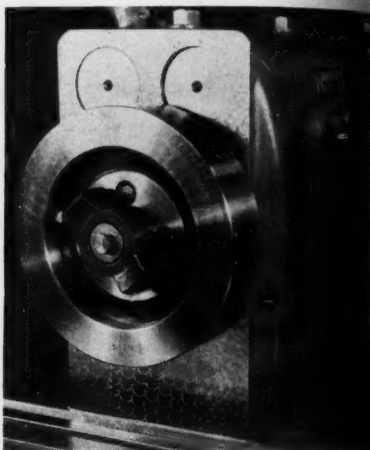
WALTHAM MACHINE WORKS

Waltham

Massachusetts

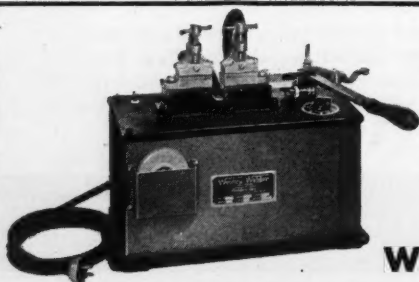
Weddell Flywheel Arbor and Adapter

As a simple adjunct to the use of carbide or fly cutters, Weddell Tool, Inc., 1239 University Ave., Rochester 1, N. Y., has developed a flywheel arbor



Weddell Flywheel Arbor

of the type illustrated herewith. To use, the standard shell end mill arbor is replaced by the flywheel arbor which is mounted on the spindle of the machine. This combination arbor and flywheel has a nose on which the milling or fly cutter is fastened and driven. The flywheel arbor is made with counterbored back or locating means to fit any milling machine or horizontal boring mill. The arbor nose is made in standard sizes from $\frac{3}{4}$ to $2\frac{1}{2}$ inches in diameter.



BAND SAW WELDERS

No. 141 may be had without grinder or with grinder for removing flash. Has 6 point hand control, one for annealing weld.

Welds saws $\frac{3}{4}$ " wide and smaller.

110 volt 60 cycle single phase. Can be made in 220 volt.

Send for catalog.

WELDEX INC.

7327 McDonald Ave.
DETROIT

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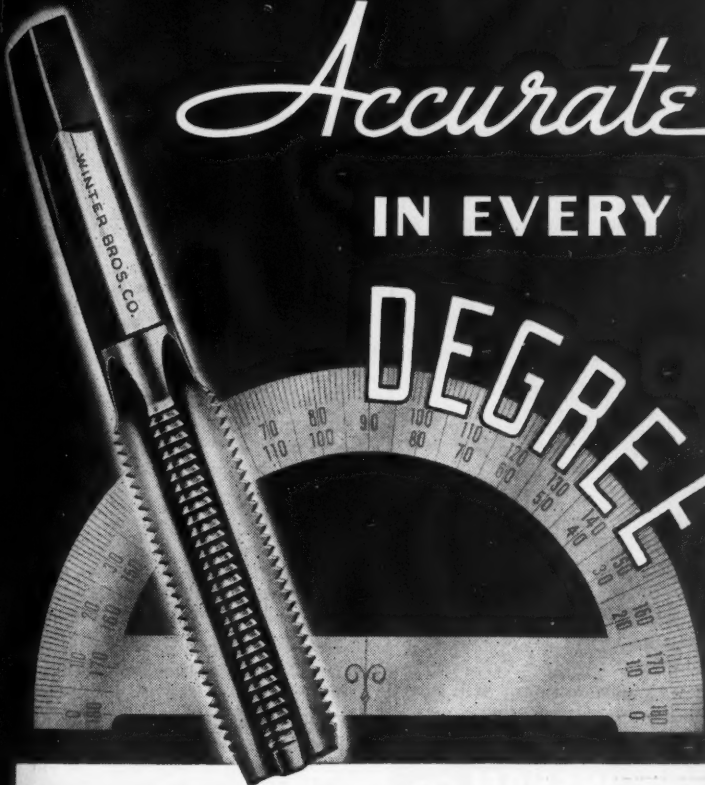
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August, 1944

Accurate IN EVERY DEGREE



The degree of Accuracy that made WINTER TAPS the approved threading tools of a host of Nationally known manufacturers will serve you equally well on all YOUR tapping jobs. Give them the care you would any other precision tool and they will be cutting good threads long after you would normally expect to discard them.

A DIVISION OF THE NATIONAL TWIST DRILL & TOOL CO., ROCHESTER, MICHIGAN

Winter Brothers

COMPANY  Wrentham, Massachusetts, U.S.A.
BRANCH STORES SAN FRANCISCO CALIFORNIA - CHICAGO ILLINOIS - DETROIT MICHIGAN

MODERN MACHINE SHOP 241

For the use of cutters which fit directly on the spindle, a flywheel spindle nose adapter is offered, the back of which is counterbored or adapted to fit the machine spindle nose while the front is the same as the machine spindle nose, permitting mounting of standard cutter. Similar adapters are available which permit the use of taper shank cutters.

The Weddell Flywheel Arbor and adapter are furnished in standard sizes to fit standard machines or can be made in special sizes and shapes to meet various requirements.

HEAVY BEVEL



SAFETY (Reg. Trade Mark) LETTERS and FIGURES

Deeper, clear impressions. Will not spall, will not mushroom. Any size character from 1/32" up.

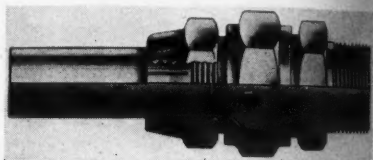


158 Carson St., Pittsburgh 19, Pa.

Cotner-Wilkinson "Collet Grip" Tube Fitting

Known as the "Collet Grip," a tube fitting which is said to provide a leak-proof, vibrationproof connection without the necessity of threading, welding, or soldering the tubing is announced by the Cotner-Wilkinson Co., Division of Logansport Machine Co., Inc., Logansport, Indiana.

Distinctive features of the fitting include a saw slot in the collet which is said to allow a uniformly firm grip of the entire surface of the tubing, thereby eliminating transmission of shock or vibration to the flare seal; a compression

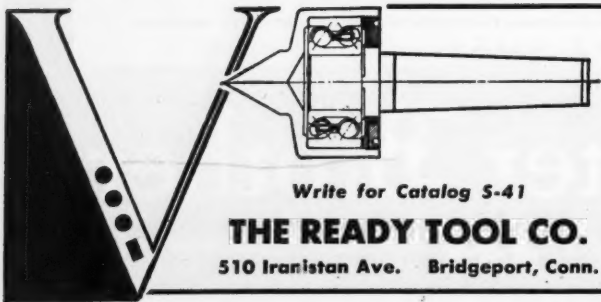


Cotner-Wilkinson "Collet Grip" Tube Fitting

n nut which compresses the collet nut to the tube, giving it a firm, bulldog-like grip that cannot, it is claimed, be loosened under vibration or shock from the hydraulic system; and the long bearing surface of the collet nut which is said to grip and hold the tube firmly without damage by cutting or digging.

According to the manufacturer, the Cotner-Wilkinson Collet Grip Tube Fitting provides a connection that will hold up beyond the strength of the tubing itself, and may be used repeatedly. The fitting may be easily assembled or disassembled without damage to flare or tubing by tightening or loosening the compression nut.

Cotner-Wilkinson Collet Grip Fittings are made in both double and single nut



THE READY TOOL CO.

510 Iranistan Ave. Bridgeport, Conn.

CENTER POINTS RUN TRUE at all speeds

...because a double-row preloaded precision bearing and ground-after-assembly point contribute to the accuracy and rigidity of Red-E Live Centers.



WHAT DO *You* PAY FOR IN CARBIDE TOOLS?

Carbide tipped cutting tools have done such a phenomenal job in increasing production, cutting costs and improving quality that it is easy to overlook some fundamentals when we talk about carbides.

For example, tool cost per piece with carbides depends even more on the know-how of tool design, grade selection, precision, manufacture, and application than it did with high speed steel tools.

To meet mass tooling requirements for war, everybody in the carbide industry—including ourselves—has been producing so-called "standard" tools. Even in peacetime, of course, there will be a place for such tools, but we also know that when COST PER PIECE is an important consideration, the lowest priced tool is not necessarily the best.

We at T.C.T. have been producing carbide cutting tools since they were first introduced in the United States. We know from experience that T.C. tipped tools, tailored for a specific job more than pay for their initial cost. It is well at this time not to lose sight of this fact, when most of us have become accustomed to ordering standards to obtain something in a hurry.

TUNGSTEN CARBIDE TOOL
Company

2661 Joy Road, Detroit 6, Michigan



designs. The double nut fittings are available in five standard shapes for tube sizes from $\frac{1}{4}$ to 1 inch. Heavy duty fittings (double nut) are made in the same standard shapes for tube sizes ranging from $\frac{1}{2}$ to 2 inches. Single nut fittings are simplified for close work, but retain the "Collet Grip" principle. The single nut fittings are likewise available in five standard shapes for tube sizes from $\frac{1}{4}$ to 1 inch. Special shapes and sizes of fittings can be furnished to specifications.

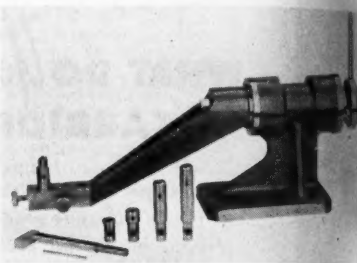
U. S. Model No. 45 Radius Dresser

A precision radius dresser with capacity for producing radii up to $4\frac{1}{2}$ -inch on grinding wheels and designated as the Model No. 45 is announced by the U. S. Tool & Mfg. Co., P. O. Box 278, Dearborn, Mich. The dresser is furnished with three different length diamond holder bushings to assure ample support for diamonds when small or large radii are being formed.

The Model No. 45 is equipped with Timken taper bearings throughout and is well balanced to eliminate vibration. Graduations plainly etched on a chrome-

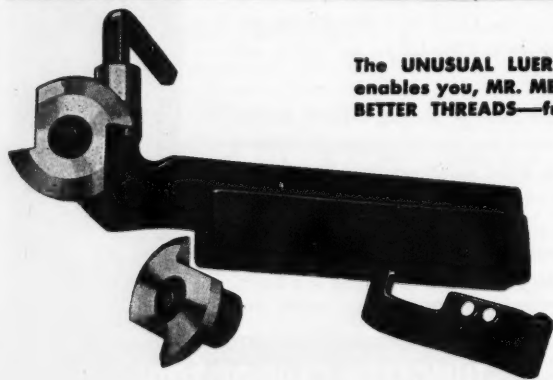
plated metal ring, together with a lock-stop on the spindle, provide means for accurately adjusting dresser to the radius desired on wheel.

The U. S. Model No. 45 Radius



U. S. Model No. 45 Radius Dresser
for Radii up to $4\frac{1}{2}$ Inch

Dresser is built mainly of cast iron, with all unpainted, exposed surfaces chrome plated. The spindle is protected against abrasive dust by leather seals. Weight of the Model No. 45 is 38 pounds.



The UNUSUAL LUERS Patented Threading Tool enables you, MR. MECHANIC, to chase threads—BETTER THREADS—from 25% to 50% FASTER.

WHY?

Ask for a circular.

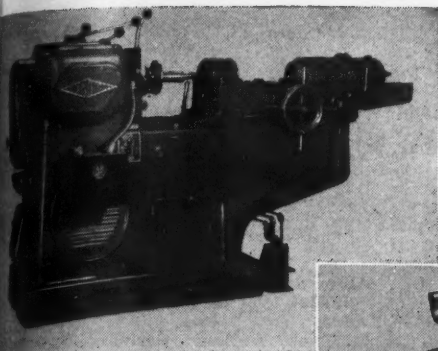
MANUFACTURED
BY
12 PINE ST.

J. MILTON LUERS

MT. CLEMENS, MICH.

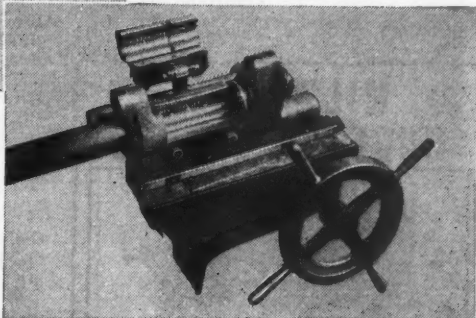
Produced under License issued by John Milton Luers Patents Inc.

with a lock-
means for
r to the
45 Radius



The Landmaco Threading Machine (at left), built by the Landis Machine Co., Waynesboro, Pa., is a good example of a leadscrew application of Ampco Metal.

These leadscrews (see below) are split, and the upper half is in two sections.



Where wear
would mean play
... and costly loss
of smoothness

... Landmaco Threading Machine is protected
with leadscrew nuts of Ampco Metal



AMPco

Metal

The Metal without an Equal

Reg. U.S.
Pat. Off.

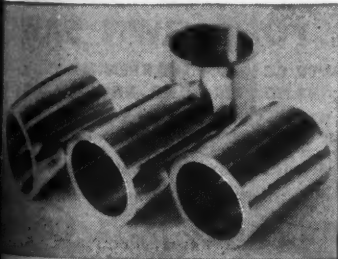
Leading machine-tool builders (almost 100 of them!) protect you against costly failures and breakdowns by using Ampco Metal parts at critical points—to resist wear, impact, fatigue, etc. This superior alloy of the aluminum bronze class lasts several times as long as ordinary bronzes — enabling you to avoid delays due to metal failure. Ask about Ampco Metal parts when you buy machinery. Also use Ampco to replace parts that fail. Write for bulletins.

Ampco Metal, Inc., Dept. MM-8, Milwaukee, Wis.

**When you replace
bronze parts —**

... especially on older machines which were not Ampco-equipped ... be prepared to install Ampco Metal. Let the nearest Ampco field engineer study your maintenance needs and recommend a reserve stock of the grades you need.

M-1A



Machine-tool bushings of Ampco Metal.

MICH.

August, 1944

Walker Permanent Magnetic Chuck

A permanent magnetic chuck of top plate design which is said to possess greater stamina, versatility, and holding power than chucks previously announced by this firm is now being marketed by the O. S. Walker Co., Inc., Worcester, Massachusetts.

The chuck is described as incorporating a unique, efficient method of energizing and is time-tested for retention of holding power. In addition, its finer pole divisions and wider magnetic sur-



Walker Permanent Magnetic Chuck

face are said to result in greater holding power over a more effective magnetic area.

The Walker Permanent Magnetic Chuck can be furnished in a number of different divisions to meet individual requirements in work holding. Chucks for special adaptations or applications can also be supplied.

MILWAUKEE SURFACE PLATES



36" x 48" . . . semi-steel . . . accurately machined. Securely mounted cast legs are machined and provided with adjusting screws for perfect alignment. Shipping weight, 1300 lbs. Also larger or smaller plates with planed or scraped surface. We also manufacture angles and parallels as shown underneath surface plate.

Write for details.

J. C. BUSCH CO.

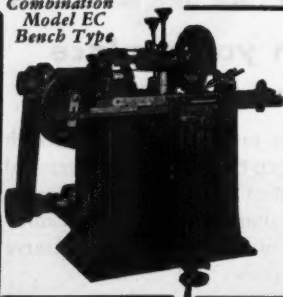
Engineers and Machinists Since 1907
126 E. PITTSBURGH AVE. - MILWAUKEE, WIS.

Diamond Self-Centering Vise

A vise with self-centering feature for use in performing milling, drilling, shaping, and other operations is now being marketed by the Diamond Tool Co., 3429 E. Olympic Blvd., Los Angeles, Cal. Both jaws are actuated by a hardened steel screw having opposite helices. Thus, by centering the cutting tool between each jaw, work is automatically centered to the tool regardless of stock thickness variations.

Since both jaws move simultaneously, the vise can be opened sufficiently for removing and inserting work through a slight turn of the screw. The jaws are serrated and hardened. Provision is made for removal and replacement of jaws of special shape or design are required. Four hold-down slots and bolts are standard features of the vise. The

Combination
Model EC
Bench Type



SHARPEN YOUR OWN SAWS

SAVE OVER 80% ON SHARPENING
HACK, BAND, CIRCULAR SAWS

The WARDWELL SAV-A-SAW automatically sharpens saws with teeth as fine as 32 to the inch at a speed up to 75 per minute. Savings on 2 gross of blades will pay for the machine. Assures keener cutting saws at extremely low cost.

Write for complete information.

THE WARDWELL MFG. CO.

3166 FULTON RD.

CLEVELAND, OHIO

MEMORANDUM

*How to get longest blade life
and shortest down-time with
McCrosky Inserted-Blade
Cutting Tools*

**PRACTICAL MANUALS ON HOW TO
GET MOST FROM THE TIME-SAVING,
COST-CUTTING FEATURES of McCrosky
TOOLS**

McCrosky BORING BAR MANUAL covers the design and use of McCrosky Adjustable Block Boring Bars. It includes detailed instructions with diagrams on changing blocks in bar, controlling float for finishing cuts, adjusting blades and regrinding, speeds and feeds.

McCrosky REAMER MANUAL is primarily planned for users of McCrosky SUPER Adjustable Reamers, but much information is applicable to all types of reamers. It contains instructions on blade adjustment, grinds for reaming different types of metals, and speeds and feeds.

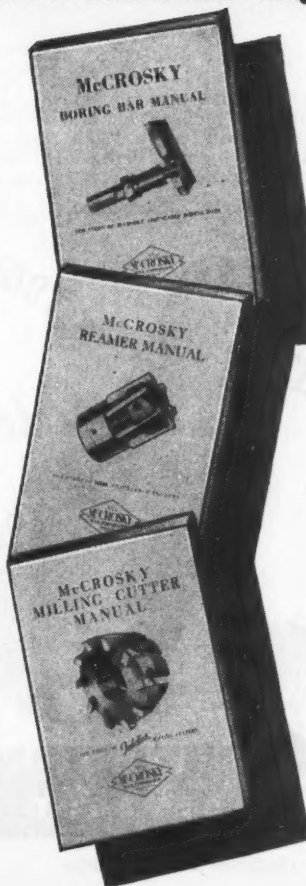
McCrosky MILLING CUTTER MANUAL gives detailed instructions on how the blade-locking wedge and the blade-adjusting screw in McCrosky Jack-Lock Cutters can be used to shorten down-time and reduce to a minimum the amount of blade stock sacrificed in regrinding. Other topics applicable to all types of milling cutters: mounting of cutters, speeds and feeds, basic grinds, action of cutting fluids, cutter care.

Send for McCrosky Manuals by titles,
stating your job or department.

For further information, write to
MCCROSKY, MEADVILLE, PA.

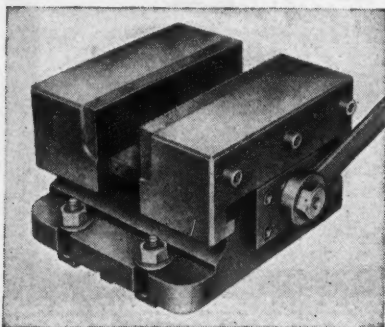


Super Adjustable Reamers • Jack-Lock
Milling Cutters • Wizard Quick-Change
Chucks • Adjustable Block Boring Bars
Turret Tool Posts • Special Purpose Tools



tongue provided on the bottom of the vise automatically aligns jaws with table edges and is designed to fit standard size slots.

Specifications of the Diamond Self-



Diamond Self-Centering Vise

Centering Vise are as follows: overall height, $1\frac{1}{4}$ inches; overall width, $6\frac{1}{4}$ inches; overall length, $7\frac{1}{4}$ inches; width of jaws, 6 inches; depth of jaws, $1\frac{1}{2}$ inches; maximum opening, 2 inches; net

weight complete with four hold-down bolts, approximately 36 pounds.

Thomas Redesigned Bending Rolls

A completely redesigned line of bending rolls built of electrically-welded rolled steel plate and capable of rolling angles, tees, flats, rounds, squares, pipe, beams, channels, and special shapes of almost unlimited variety has been announced by the Thomas Machine Mfg. Co., Pittsburgh, Pennsylvania.

Arcs, spirals, or circles can be formed on the machines, which are available in four sizes comprising vertical type rolls for bending angles 2×2 inches 3×3 inches, and 4×4 inches, and horizontal type rolls for bending angle up to 6×6 inches. Weights of the four sizes range from 3,500 to 35,000 pounds.

The Thomas Redesigned Bending Rolls are of all-steel construction, with cast steel bearing housings welded in place. The bearings are bronze bushes and lubricated with high pressure fittings.

The vertical type benders have horizontal shafts and bend material in a



Accelerating **WAR PRODUCTION**

Speed your output with Criterion Diamond Tools. The kind of service they give is responsible for the swift, steady increase in their use. Quality of diamonds employed plus a unique method of setting assure extreme rigidity and extra tool life. Special tools made to order following blueprints or specifications. Sharp-pointed, selected thread grinding tools. Ask your dealer or order direct. Request free literature.

CRITERION MACHINE WORKS
BEVERLY HILLS, CALIFORNIA

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MILLING CUTTERS • BROACHES • FORM TOOLS • END MILLS • HOBS

COUNTER BORES • REAMERS • STANDARD END MILLS AND MILLING CUTTERS FROM STOCK • SPECIAL CARBIDE TIPPED TOOLS

LEADING MANUFACTURERS IN EVERY FIELD OF INDUSTRY DEPEND ON LAKE SHORE FOR ALL OF THEIR REQUIREMENTS IN MILLING CUTTERS

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Douglas Aircraft

CURTIS-WRIGHT

CROSTLEY
MINNEAPOLIS-MOLINE POWER IMPLEMENT

CRUCIBLE STEEL

CHRYSLER

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D. O. JAMES MANUFACTURING CO.

INTERNATIONAL HARVESTER

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OLDSMOBILE

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GE

OTIS ELEVATOR

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STUDEBAKER

REMINGTON RAND

PRATT & WHITNEY AIRCRAFT

Ford

MUNCIE GEAR

CHEVROLET

OHIO SEAMLESS TUBE

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AEROMAX

SAVAGE ARMS

Massey-Harris

GLOBE TUBES

Allison

REPUBLIC Aviation

TELETYPE

MILLING CUTTERS • BROACHES • FORM TOOLS • END MILLS • HOBS

Each of every Lake Shore plant are the facilities and skilled personnel of one of America's most completely equipped plants.

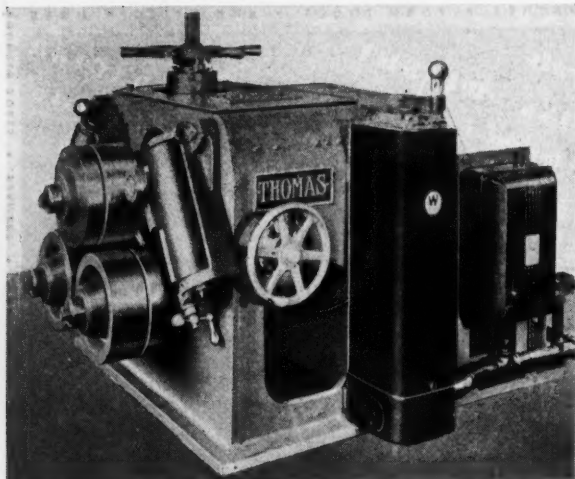
LAKE SHORE

TOOL WORKS INC.

Send us your blue prints for quotations on your high speed tool, special tool, and carbide production tool requirements.

14 NORTH KOSTNER AVENUE • CHICAGO 51, ILLINOIS

MODERN MACHINE SHOP 249



Thomas Vertical Bending Roll

vertical plane. The motor and reduction gear unit enclosed with anti-friction bearings—is mounted on an extension of the main frame so that the machine is entirely self-contained above the floor.

The horizontal type bending rolls have

ing and keep the leg of the angle square when rolled leg in. When angle is rolled leg out, this roller serves as a gauge to indicate when the proper diameter is rolled. It can also be used for enlarging circles which have been rolled too small

the rolls on vertical shafts and roll the material in a horizontal plane. The machines are each driven through a fully enclosed speed reducer located in a pit below the floor, and all shafts are mounted in anti-friction bearings. This construction allows for easy access to the machine from all sides and also provides for a reduction in floor space required.

An outstanding feature of the Thomas Redesign Bending Roll is an adjustable roller which is said to counteract twist

Diamond SELF-CENTERING VISE

ACCURATELY centers and aligns work for milling, drilling, shaping, etc. Once tool is centered to jaws, work is automatically centered since both jaws operate simultaneously. Centering is unaffected by variations in stock thickness. Work is gripped evenly and tenaciously with parallel, serrated, hardened steel jaws. All castings special, high grade semi-steel, "beefed up" for extra rigidity and strength. Husky alloy steel screw hardened for long life.

DEALERS WANTED! FOR MORE INFORMATION WRITE
DIAMOND TOOL COMPANY
3427 E. OLYMPIC BLVD., LOS ANGELES 23, CALIFORNIA

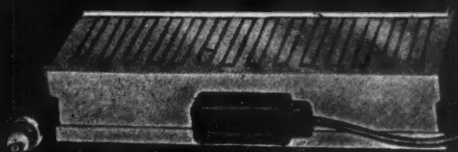


DIMENSIONS

Overall Height.....4 1/4"	Width of Jaws.....4"
Overall Width.....6 3/4"	Depth of Jaws.....1 1/2"
Overall Length.....7 1/2"	Maximum Opening.....2"
Net wt. complete with 4 hold down bolts 3/8" diameter, approximately...36 lbs.	
PRICE: F.O.B. FACTORY, \$43.00	

Manufacturers of the DIAMOND Line of Precision Milling Machines and Accessories

WALKER MAGNETIC CHUCKS

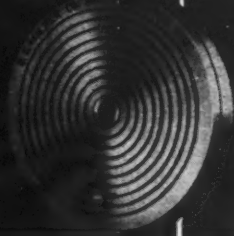
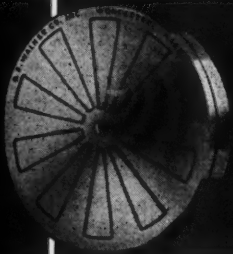


Walker presents a complete line of Magnetic Chucks for modern equipment . . . Rectangular, Swiveling and Rotary Types in all sizes.

**"THE BEST WAY TO HOLD MOST WORK—
THE ONLY WAY TO HOLD SOME WORK."**

Also belt or motor-driven DC and portable AC Demagnetizers.

Write for Catalog W-7



O. S. WALKER CO., INC.
WORCESTER, MASS • U. S. A.

**FASTER,
CLEANER,
SMOOTHER**



metal cutting with VICTOR

First, select the *right* blade for the job . . . see that it is *properly* strained in the frame . . . start the cut at the *correct* angle . . . gauge *speed* and *pressure* of stroke by type and shape of metal being cut.

These, and many other important factors are discussed and illustrated in the booklet "Metal Cutting" prepared by Victor Saw Works, Inc. This is an instruction manual on metal cutting that should be used by every mechanic engaged in machine shops, on assembly lines, in shipyards, on maintenance work, or in the small contractor's shop.

VICTOR hand and power Hack Saw Blades, Frames, and Flexible Back Metal-Cutting Band Saw Blades are designed, processed and heat-treated to give fast, accurate cutting service on metals of many types and under various working conditions. Copies of "Metal Cutting" are FREE. Send for yours today.

VICTOR SAW WORKS, INC.

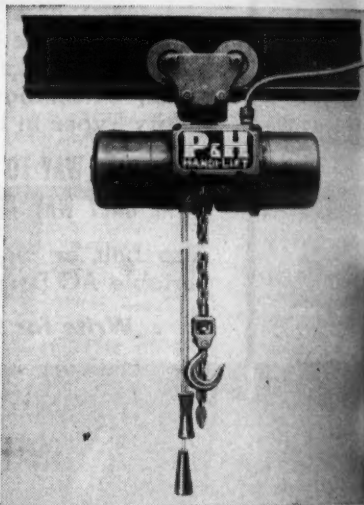
MIDDLETOWN • NEW YORK

Makers of hand and power hack saw blades, frames, and metal cutting band saw blades.

The work rolls are quickly adjustable in the width of slot by means of stud and lock unit. Fully hardened on wearing surfaces, the rolls are located on the closest possible centers, thereby reducing to a minimum the length of the straight ends on finished circles. All three roll shafts, which are high carbon steel forgings, are power driven, thus enabling small diameters to be rolled with a single pass through the machine.

P&H "Handi-Lift" 500-Lb. Electric Chain Hoist

Adaptable for bolt, hook, or trolley mounting, an electric chain hoist of 500-lb. capacity, to be known as the P&H



P&H "Handi-Lift" 500-Lb. Electric Chain Hoist

"Handi-Lift," has been developed by the Hoist Division, Harnischfeger Corp., 4400 W. National Ave., Milwaukee 14, Wis. Of fully enclosed construction to allow for use under any condition of weather, dust, moisture, or acid fumes, the hoist, in trolley service, can be suspended either parallel or crosswise to beam. The chain of the unit is proof-tested for 1800 pounds.

The Handi-Lift can be easily operated

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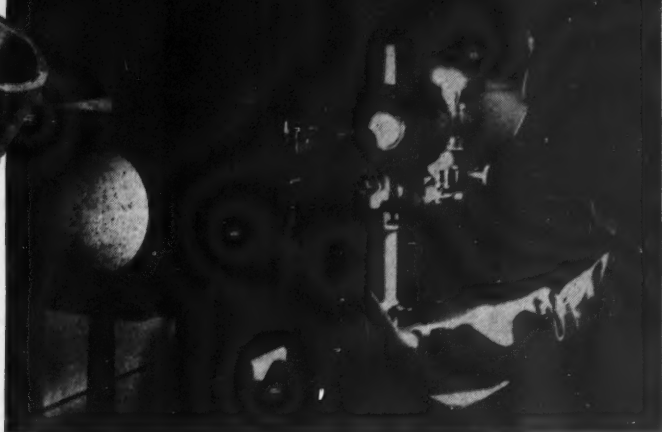
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gust, 1940



**THE RIGID METALLURGICAL AND
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BUCKEYE BEARINGS

**Assures thorough dissempement of all com-
ment metals and freedom from porosity
resulting in unsurpassed serviceability**

● Manufactured from selected metals under Buckeye's complete laboratory control of charging ratios and melting and pouring temperatures, assures the production of a uniformly high quality of product, each piece of which, month after month measures up fully to Buckeye's exacting specifications.

For easy assembly and long efficient satisfactory service, specify Buckeye bearings by brand name. They are furnished fully finished in 1088 ready-to-use stock sizes—in cored and solid 13" bars—in several graphited styles—and in any OD, ID and length, slotted, split, drilled or flanged, exactly to customer's blue-print. No order is too big or too small for Buckeye.

Let us quote on your requirements.

Buckeye

BRASS AND MANUFACTURING COMPANY

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BRONZESMITHS

SINCE 1900

CLEVELAND, OHIO



BRONZE SLEEVE BEARINGS • STANDARD SIZES OR TO CUSTOMERS' BLUEPRINT
IN ANY RECOGNIZED BEARING METAL ANALYSIS

by one hand through a convenient pull cord actuating a simple lever toggle arrangement, thus leaving the other hand free to guide the load. The chain wheel, which is forged of high carbon steel and heat treated, is splined to the drive gear. Over-travel of hook at both upper and lower limits is prevented by a zinc die-cast safety limit stop which also actuates control for raising and lowering loads.

Dual braking is provided by a large spring-set electric motor brake which automatically releases when hoist is operated and sets instantly with shutoff

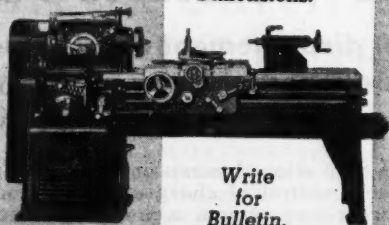
current. Lowering control is effected by dynamic means supplemented by the spring-set brake which holds the load should current fail. All brake parts are die-cast.

Additional features of the Handi-Lift include anti-friction bearings throughout; simplified planetary gear drive with long life assured by husky drop-forged stub-tooth gearing; flood lubrication; silver-to-silver switch contacts to provide positive trouble-free circuit; high-starting torque, reversible type motor with sealed bearings; wide mouthed forged steel hook equipped with ball bearings for free swiveling and yoke which can be used as a clevis by removing hook. The hoist is designed for operation on 3-phase 60 cycle current, 220 or 440 volts, and is supplied complete, ready to install as specified.

CARROLL AND JAMIESON LATHES 15" AND 16"

12 Speed Geared
Head Motor Drive
Timken Mounted
Spindle.

Modern Design—
Liberal
Dimensions.



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THE CARROLL & JAMIESON
MACHINE TOOL CO.

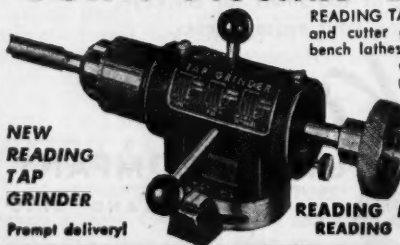
DAYTON • OHIO, U. S. A.

Pratt & Whitney ANPT Gages

The rigid specifications set up by the Army and Navy covering aeronautical pipe threads are said to be fully met by a line of gages now being offered by Pratt & Whitney, Division Niles-Bement-Pond Co., West Hartford, Conn. These gages are designed to provide a rapid, accurate check of pipe threads made to the latest Army and Navy aeronautical pipe thread specifications known as Spec. An-GGG-P-363, Amendment No. 2, Symbol ANPT.

The Pratt & Whitney ANPT Gages are made in several types. For checking the accuracy of internal threads, a double-end gage is available carrying L1 and L3 thread plug gages which are designed to check lead, form, diameter and taper. A plain taper plug gage also available is used to check taper, roundness and minor diameter.

DON'T DISCARD DULL TAPSI!



NEW
READING
TAP
GRINDER

Prompt delivery!

READING TAP GRINDER can be used on tool and cutter grinders—surface grinders—even bench lathes. Taps sharpened after center is destroyed. **No collets.** Complete. No extras. Write!

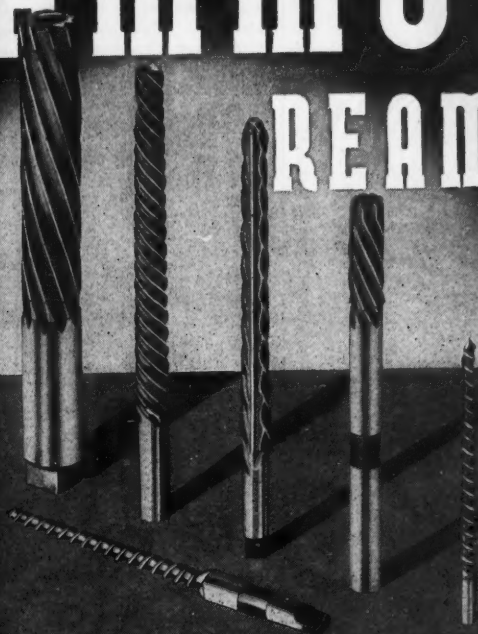
Broach Keyseater

The Reading Bench Machine does not require bushings or guides. Very fast capacity from 1/8 to 1/2 cutter. Low first cost.

READING MACHINE COMPANY
READING (CINCINNATI), OHIO



GAMMONS REAMERS



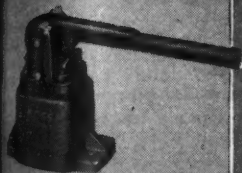
Manufacturers of

- The Gammons Helical Taper Pin Reamer
- The Gammons Helical Chucking Reamer
- The Gammons Helical Die Makers Reamer
- The Gammons Duplex Taper Pin Reamer

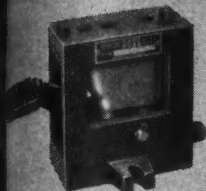
*Special reaming problems invited
Send for Catalog*

THE GAMMONS-HOAGLUND CO.
MANCHESTER CONNECTICUT

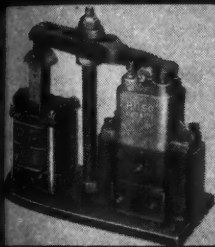
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HAND CONTROL



FOOT CONTROL



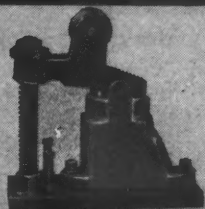
SOLENOID CONTROL

96

STANDARD

types and Sizes

AIR CONTROL VALVES



MECHANICAL CONTROL



ALL AIR CONTROL



PILOT CONTROL

Ross builds 96 standard types and sizes of air control valves. In most cases one of these will exactly meet your requirements—when, however, unusual demands call for a special design, then we engineer a valve to most efficiently fit your needs.

Representatives in Principal Centers

ROSS Operating VALVE CO.

6484 Epworth Blvd.

Detroit 10, Mich.



THE BRIDLE FOR AIR HORSEPOWER

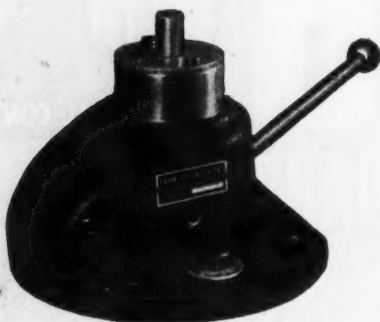
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August, 1944

Nork Hand-Operated Collet Vise

Compact and light in weight, the Nork Hand-Operated Collet Vise shown



Nork Hand-Operated Collet Vise

herewith, product of the Nork Products Co., 5897 S. Main St., Los Angeles 3, Cal., is said to be extremely useful for quickly setting up a wide variety of work. Its internal piston serves as a solid stop and automatically ejects work

when the collet is released. The collet is said to be drawn in and pushed out without sticking. Fast operation is assured by a long handle moving through a short throw.

All working parts of the Nork Hand-Operated Collect Vise, including the collet seat, are hardened and ground, and the seat is located precisely at right angles to the base. Seven chip guards are furnished in steps of $\frac{1}{16}$ inch, and the chip seal serves as a stop for shoulder work. A base outlet permits finished work to drop through into a pan.

The Nork Collet Vise is available in $\frac{1}{2}$ and $\frac{3}{8}$ -inch capacities and is designed for use with standard collets.

Detroit Multiple Thread Taps

Special Acme multiple thread taps for threading of quickly removable type fittings such as are used in aircraft assemblies for fastening cowling, and so on are now being produced by the Detroit Tap & Tool Co., 8432 Butler St., Detroit 11, Michigan.

Accurately designed so as to allow for

DESMOND GRINDING WHEEL DRESSERS



Desmond Hex Dresser



Desmond Heavy-Duty Dresser



Desmond Huntington Dressers

Our Desmond Huntington Cutters are made in all sizes.

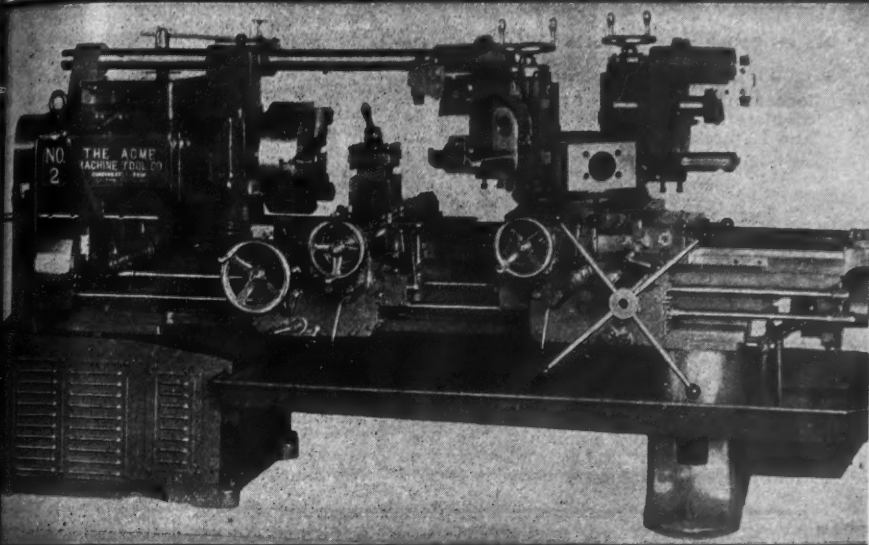


We manufacture only complete line of dressers and cutters on the market, and will be glad to send samples for trial. Write for copy of our new catalog and name of your nearest jobber.



THE DESMOND-STEPHAN MFG. CO.
URBANA • OHIO

Power and Speed



This Cincinnati-Acme No. 2 universal turret lathe is rigidly constructed to provide accuracy under heavier cutting at top speed.

Head and bed are combined into one rigid, well braced casting—cross ribbed the entire length to carry great loads without vibration.

Other salient features include - -

- Quiet high speed transmission
- Lubrication by splash and pump
- Spindle mounted on precision roller bearings
- Apron fully enclosed—removable front plate
- Rigid square turret carriage
- Ten long feed stops for main turret
- Rapid power traverse—either direction.

WRITE FOR COMPLETE DETAILS

THE ACME MACHINE TOOL CO.
CINCINNATI • OHIO



Detroit 1/4-Inch Double Thread Tap

easy removal from fittings without loosening, the taps are available in diameters from 3/8 to 1 inch—both 10 and 12 pitch—and in types ranging from double to sextuple thread taps.

Turco Re-Lite Blackout Paint Stripper

A special blackout paint stripper to be known as Turco Re-Lite has been placed on the market by Turco Products, Inc., 6135 S. Central Ave., Los Angeles 1, California.

Formulated primarily for blackout paints of both asphaltic and non-asphaltic types, Turco Re-Lite is a ready-to-use stripper with characteristics required for satisfactory application to windows, street light globes, and other vertical surfaces. Of heavy body, it is said

to cling to any surface without running, thus permitting close control with a brush to confine its action to definite areas, and also eliminating waste.

In action, Turco Re-Lite is said to be fast and thorough, even on paint which has been baked on light globes. According to the manufacturer, it is noncorrosive to any metal and will not attack concrete, brick and mortar, stone, tile, or marble. Although of heavy consistency, the stripper is claimed to have good penetration and cleaning power on porous materials, especially when well brushed. Cold water provides for complete rinsing of painted surface to which Re-Lite is applied. And, since the stripper is said to become inactive the instant it comes in contact with water, the rinsing operation cannot affect adjacent painted surfaces which do not require stripping.

Acromark No. 54 Marking Machine

A machine which is said to simultaneously mark two sides of hexagonal nuts as fast as they can be fed into marking position is announced by The Acromark Co., 9 Morrell St., Elizabeth

Leakproof and Trouble Free



**Here's
WHY**



Note powerful double grip afforded by long extra heavy lever rules, machine formed over special shoulder on shank.

Leading plants all over the country are saving air, speeding production and avoiding maintenance thru use of AIR-O-CHEK Air Guns—the only air guns with the ball and socket joint between the enclosed lever and the valve. This patented feature provides correct leverage to open the valve with a slight flex of the hose. Air shut-off is instant and positive. Packing glands and external levers are eliminated.

AVOID SUBSTITUTES. No other air gun duplicates AIR-O-CHEK performance. Prompt delivery on high priorities.

Catalog on request.

AIR-WAY PUMP & EQUIP. CO., • 401 S. Jefferson St., • Chicago 7, Ill.

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R-O-CHEM

Chicago 7, Ill.

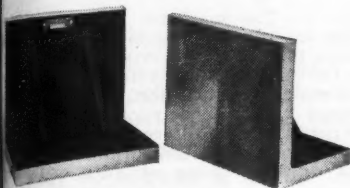
August, 1944

FOR P-R-E-C-I-S-I-O-N MACHINE WORK

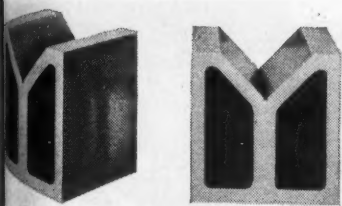
SOLID PARALLELS
14 sizes—From $\frac{1}{4} \times \frac{1}{4}$ -
x6 in. to $1\frac{1}{4} \times 2 \times 12$ in.



BOX PARALLELS — 18 sizes
From $1\frac{1}{2} \times 2 \times 4$ in. to $12 \times 12 \times 24$ in.



ANGLE PLATES — 22 sizes
From $3\frac{1}{2} \times 4 \times 4$ in. to $24 \times 24 \times 24$ in.



V-BLOCKS — 7 sizes
From $2 \times 2\frac{1}{2} \times 5$ in. to $12 \times 12 \times 12$ in.

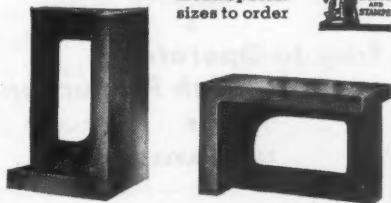
Choose **CHALLENGE!**

High-speed production schedules are easy for **CHALLENGE SURFACE PLATE EQUIPMENT** because they're made from fine-grained, special analysis semi-steel castings, precision ground to the required accuracy. Specially heat-treated.

This equipment includes—

Solid and Box Parallels for setting and leveling to parallel and exact height for checking and inspection . . . Right Angle Irons for providing square reference lines . . . Angle Plates for clamping and holding work . . . and V-Blocks for supporting shafts and other cylindrical work when drilling, checking, inspecting, etc.

You will find these shop-tested aids make for fast, accurate *trouble free* production. Write today for detailed data on Challenge Surface Plate Equipment. Special sizes to order



UNIVERSAL IRONS—4 sizes
From $4 \times 5 \times 3\frac{3}{4}$ in. to $8 \times 10 \times 5\frac{1}{2}$ in.

490

THE CHALLENGE MACHINERY CO.

MAIN OFFICE AND FACTORY:
GRAND HAVEN, MICH. ★

EASTERN SALES OFFICE:
50 CHURCH ST., NEW YORK



SCREW HEAD SLOTTER

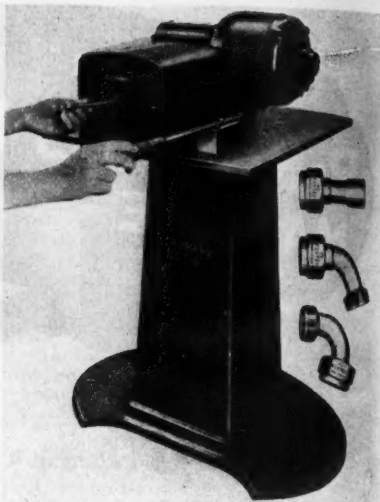
$\frac{1}{8}$ " to $\frac{1}{2}$ " Screw Body Diameter.
Will not injure screw threads.

Easy to Operate
High Production

ALSO MAKERS OF
ROTARY TABLES — MILLER VISES
MULTIPLE SPINDLE CENTERS
SCREW MACHINES

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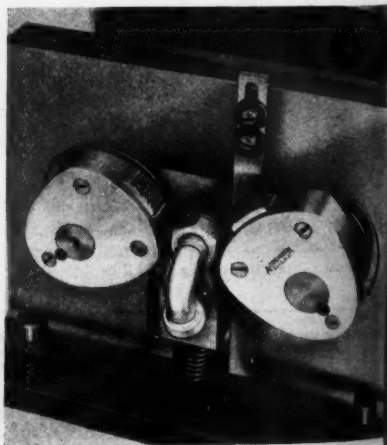
JOHN B. STEVENS INC.
482 CANAL ST., NEW YORK 13, N. Y.



Acromark No. 54 Marking Machine

4, N. J. The machine, which is designated as the No. 54, is equipped with double marking rolls with dies that roll the desired markings into the nuts, thus minimizing deformation. A new development in die construction is said to compensate for differences in lettering on each side, resulting in uniform markings on both sides of nuts. Marking

Close-up view of marking rolls of Acromark No. 54 Marking Machine

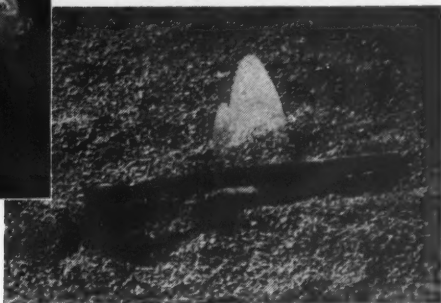




GREASY FLOORS INVITE FIRE!



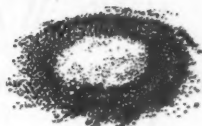
FIDELITY ABSORBO RESISTS FIRE



MAKE YOUR FLOORS *Fire-safe*

Fidelity Absorbo is approved as a Class 1 non-combustible by Underwriters' Laboratories. It is easy to apply—just sprinkle it on and sweep up. It immediately absorbs oil and grease up to 50% of its own weight. In case of recurring oil spills, it may be allowed to remain until thoroughly saturated, during which time your floors are fire-resistant. Fidelity Absorbo is non-abrasive . . . being composed of sponge-like granules, it will not mar machine parts or surfaces. It makes floors footsure . . . preventing slipping and skidding accidents. It is odorless and harmless to skin, clothes, shoes and floors. It is also economical . . . a little goes a long way and it can be used until thoroughly oil-soaked.

Send for a trial 50-lb bag at \$2.75 F. O. B., Newark, with unconditional money-back guarantee if not satisfactory. Substantially reduced prices on quantity orders. (Territories are open for local distributors. Write for details.)



ABSORBENT



SWEEPS CLEAN



FOOTSURE



FIDELITY CHEMICAL PRODUCTS CORP.

430 RIVERSIDE AVE. NEWARK 4, NEW JERSEY

rolls are completely guarded during operation, yet, are easily accessible for changing dies. Marking depth is controlled and set by wedge lock.

In operation, the nut to be marked is placed in position on a small V-block set on slides located between the two marking rolls. The operating lever is then moved so that the marking rolls turn toward each other, the initial part of each marking die engaging the lower section of opposite faces of the nut. As the marks are indented, the work holder slides down, allowing the marks

to be progressively rolled into the nut.

The machine illustrated is built to mark nuts used on the ends of cables, however, only slight changes in design are said to be required in order for the machine to handle loose nuts from a chute feed. The unit is driven by a $\frac{1}{2}$ h. p. gear reduction motor. Main bearing points are fitted with ball bearings and secondary points with bronze bushings. The pedestal is of rigid cast iron construction, supporting the entire operating assembly at the proper height for rapid, easy control.

ROTARY FILES



HAND

CUT

CUT TIME

ALL SHAPES
Cuts & Sizes



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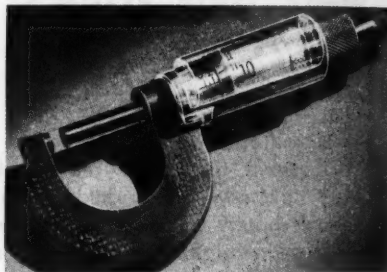
MECHANICAL DIE & TOOL CO. Inc.

11 New York Ave.

Brooklyn, N. Y.

Stebar "Magna-Eye"

Designed to enable tool and diemakers and inspectors to quickly read micrometers without eye strain, a lightweight, transparent methyl-methacrylate gad-



Micrometer Equipped with Stebar "Magna-Eye"

get which is constructed to fit closely over the scale of micrometer, magnifying the numbers and divisions, to be known as the "Magna-Eye," has been marketed by the Stebar Co., 711 W. Lake St., Minneapolis 8, Minnesota.

Low Dressing Costs Guaranteed with CALDER DRESSERS

Huntington type with High Carbon Tool Steel
Cutters—Tough and Hard

CALDER DIAMOND DRESSERS

A COMPLETE LINE OF
DRESSERS FOR EVERY
GRINDING WHEEL.

Specialists on grinding wheel dressing for 47 years.

CALDER MFG. CO.,

LANCASTER, PA.



CHUCK - CHECK

A STITCH IN TIME FOR VICTORY

The chuck on your machine needs a **LITTLE** attention **REGULARLY**. Neglect of these rules will affect the accuracy of your work and cause "down time". Chucks are essential war production tools. "Keep 'em running to keep 'em flying."

- ✓ 1. Check lubrication on every shift.
- ✓ 2. Wipe surfaces . . . especially spindle noses and bearing surfaces . . . CLEAN of chips, etc. before mounting.
- ✓ 3. Never **FORCE** chuck on spindle nose.
- ✓ 4. Keep keyways, jaw bearings free from dirt, chips, etc.
- ✓ 5. Do **NOT** open jaws beyond outer edge of chuck circumference (use larger chuck if necessary)
- ✓ 6. Use correct jaw equipment for work to be held.

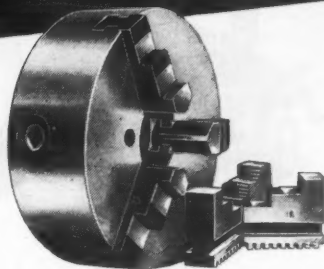
CUSHMAN
CHUCKS

THE CUSHMAN CHUCK CO. HARTFORD, CONN.

WORLD STANDARD FOR PRECISION



TAKE CARE OF YOUR CHUCKS



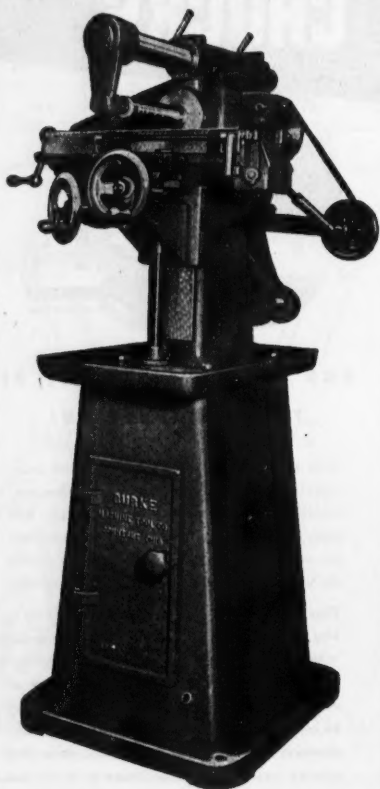
AND THEY'LL TAKE CARE OF YOUR PRODUCTION!

Your Cushman Chucks are fine precision tools, manufactured to meet your most exacting production requirements over a long service life. But today, just as war production has to go far beyond the most optimistic estimates, so must we stretch the effective life of all tools including chucks.

That is why care is so vitally important. That is why we have made up and offer for your use the "Chuck Check" card. The simple practices suggested are obvious common sense, but with so much to be done in a day, even these points may be overlooked in your plant if they are not emphasized. Because this extra care will make your chucks last longer and do better work for you we suggest that the card be posted near every machine that uses a Cushman Chuck. We will be glad to supply a quantity for use in your plant.

CUSHMAN
CHUCKS

BURKE MILLING MACHINES



**No. 4 Motor Driven MILLING MACHINE
Mounted on Cabinet Column**

Burke motor driven milling machines Nos. 1, 2, 3, and 4 are specially suited for handling small, difficult work on a production basis.

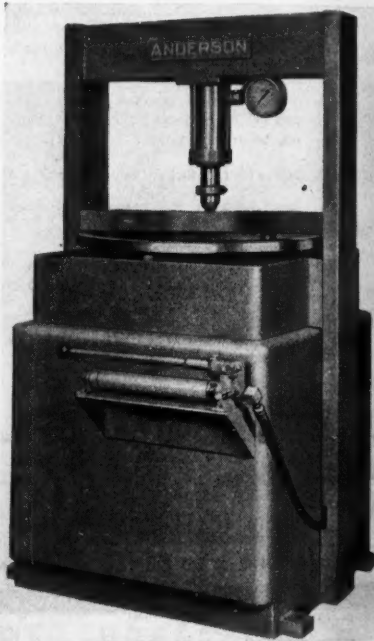
Write for complete information.

BURKE MACHINE TOOL CO.
297 E. 16th St. Conneaut, Ohio

Made so as not to interfere with the operation of the micrometer on which it is used, the Magna-Eye is said to protect the instrument from dust and dirt, thus making frequent cleanings unnecessary. The Magna-Eye is available for use with all makes of micrometers.

Anderson Model HP-0224 Hydraulic Straightening Press

Designated as the Model HP-0224, a hydraulic press with 30-inch square table for straightening large gear blanks and metal rings is now being in-



Anderson Model HP-0224 Hydraulic Straightening Press

troduced by the Anderson Mfg. Co., 1906 Kishwaukee St., Rockford, Ill. The large table is accurately machined and can be used as a checking plate.

The press as illustrated has a capacity of 20 tons and is operated by a hand hydraulic pump. Similar presses in capacities from 10 to 50 tons with

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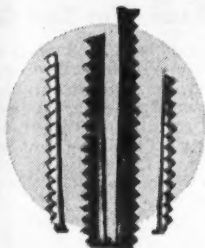
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It is **NOT NECESSARY** to

SCRAP

A
**MACHINED PART
BECAUSE OF
IMBEDDED BROKEN
TOOLS**



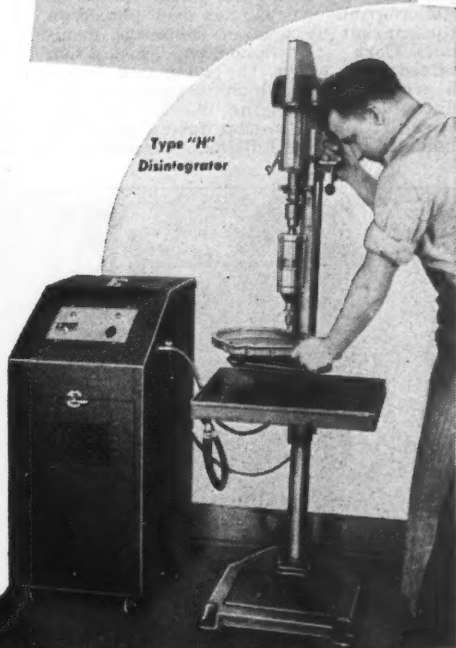
When a tap or other tool breaks off in a
part that is being machined, it may
be removed by the Elox method without
affecting the threads which have already
been cut or the surface metal of the hole.

This is done by electrical disintegration using
a low voltage, high amperage current with
a constant flow of cooling water at the con-
tact end of the electrode. The unit does not
revolve. A 110/115 volt 50-60 cycle alter-
nating current outlet and a convenient
supply of tap water are all that is needed
for the Type E. Disintegrator. The Type
H Disintegrator includes its own coolant
supply system.

The Elox method is also used to "drill"
holes of various shapes in hardened dies
and machine elements without annealing.

**Write for Technical Bulletin
and Specifications**

Type "H"
Disintegrator



ELOX
CORPORATION

3-252 GENERAL MOTORS BLDG.
DETROIT 2, MICHIGAN
Plant—18273 LIVERNOS AVENUE
DETROIT 21, MICHIGAN

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August, 1944

MODERN MACHINE SHOP 267

either hand or power control can also be furnished. A hydraulic gage calibrated in pounds indicates the actual pressure on the ram and is located in line with the operator's eye so that it can be easily read. The streamlined base is said to make the machine simple to clean and also provides foot room for the operator.

The Anderson Model HP-0224 Hydraulic Straightening Press has a ram stroke of 5 inches and maximum vertical opening of 8 inches. The unit occupies a floor space of 40 x 40 inches and has a net weight of 1,500 pounds.

Quaker "Microgrind" No. 132 Grinding Compound

A grinding compound to be known as "Microgrind" No. 132 has been placed on the market by Quaker Chemical Products Corp., Conshohocken, Pa. When mixed with water, the compound forms a grinding fluid which is said to eliminate pickup, grinding checks, glazing, burning, and distortion during grinding, honing, and superfinishing operations.

Other advantages which are said to be obtained from the use of Microgrind No. 132 are a reduction in the number of wheel dressings required, faster cutting action, and increased wheel life.

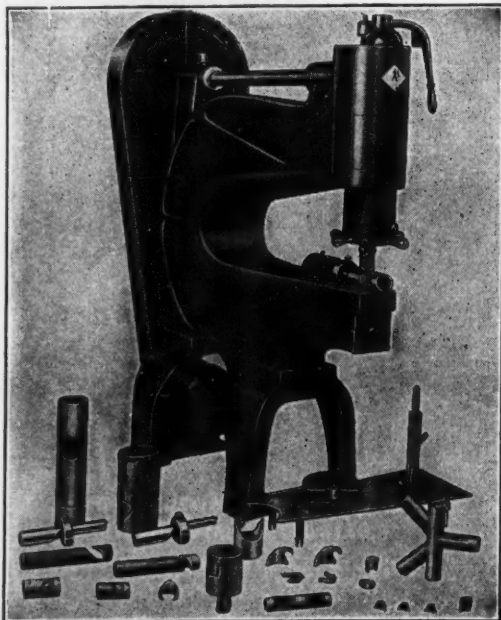
Boice-Crane Wet Tool Grinder

Having what is described as a perfectly true, concentric running, 10-inch Berea quarried sandstone wheel accurately centered on its arbor, a wet grinder for grinding straight bevel from heel to edge of tool without weakening tool temper is now being offered by the Boice-Crane Co., 937 Central Ave., Toledo, Ohio.

Designed for operation at a speed of 120 r.p.m., the grinder is said to throw no water and may be belted to a 1,750 r.p.m. motor, line shaft, or gas engine.

Zagar V-H Holding Fixture

Designated as the V-H, a holding fixture which can be used equally well in horizontal and vertical positions has been placed on the market by Zagar



For **FAST** and **SAFE** cutting of sheet metal, duplicating parts, and to relieve other machine tools, investigate the

SAVAGE NIBBLING MACHINE

TUBE SLOTTING AND TUBE SHAPING
For cutting flat sheets by template or to a scribed line.

Cutting Capacities

Flat Sheets Mild Steel $\frac{3}{4}$ "

Tough Alloys $\frac{3}{8}$ "

Tubing

Wall thickness to $\frac{3}{8}$ "

1" I.D. to 36" O.D.

The Fastest Method of Tube Slotting and Shaping by Guide Template.

Ask for BULLETIN "H"

Manufactured by

W. J. SAVAGE COMPANY

Since 1885

KNOXVILLE

TENNESSEE

Pioneer Manufacturers of Nibbling Machines

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life.

Grinder

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MACHINE

BE SHAPING
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3/8"

D.D.

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Template.

"H"

by

MPANY

TENNESSEE
Milling Machines

HOW TO GET THREAD MILLING CUTTERS

Faster

Order by
**STOCK BLANK
NUMBER**

giving Pitch and Thread Form desired

DETROIT

**STANDARD STOCK BLANKS
MEET 90% OF ALL
THREAD MILLING CUTTER
REQUIREMENTS**

SHELL TYPE

For No.	diam. in.	DC. of Flutes	Face Width	Throat Dia.	Key way
A	B	C	D	E	
201	1 1/2	8	1 1/2	5/8	1 1/2 x 1/2
202	1 1/2	8	1 1/2	5/8	1 1/2 x 1/2
203	1 1/2	10	1 1/2	5/8	1 1/2 x 1/2
204	1 1/2	10	1 1/2	5/8	1 1/2 x 1/2
205	2	10	1 1/2	5/8	1 1/2 x 1/2
206	2	2	1 1/2	5/8	1 1/2 x 1/2
207	2	2	1 1/2	5/8	1 1/2 x 1/2
208	2	2	1 1/2	5/8	1 1/2 x 1/2
209	2	2	1 1/2	5/8	1 1/2 x 1/2
210	2	2	1 1/2	5/8	1 1/2 x 1/2
211	2 1/2	2 1/2	1 1/2	5/8	1 1/2 x 1/2
212	2 1/2	2 1/2	1 1/2	5/8	1 1/2 x 1/2
213	2 1/2	2 1/2	1 1/2	5/8	1 1/2 x 1/2
214	2 1/2	2 1/2	1 1/2	5/8	1 1/2 x 1/2
215	2 1/2	2 1/2	1 1/2	5/8	1 1/2 x 1/2
216	2 1/2	2 1/2	1 1/2	5/8	1 1/2 x 1/2
217	2 1/2	2 1/2	1 1/2	5/8	1 1/2 x 1/2
218	2 1/2	2 1/2	1 1/2	5/8	1 1/2 x 1/2
219	2 1/2	2 1/2	1 1/2	5/8	1 1/2 x 1/2

SHANK TYPE

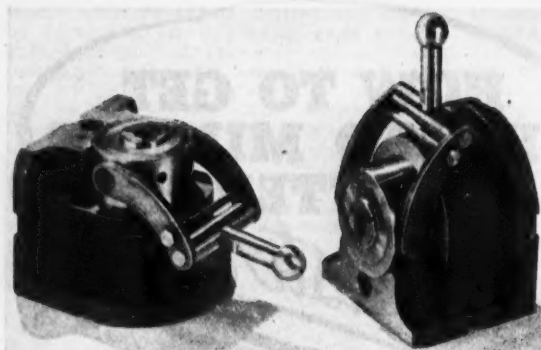
For No.	Threads Per Inch	Number of Flutes	Width of Face	Length of Shank	Length of Cutter	Stock Diameter of Body	Shank Taper			Drawing Design
							Large	Small & Chaper	Moist	
101				3 1/2	5 1/2	884	7	8		1 1/2-13NC
102						922				1 1/2-24NF
103									3	1 1/2-13NC
104										1 1/2-13NC
105										1 1/2-24NF
106										1 1/2-13NC
107		8	1 1/2	4 1/2	6 1/2	948				1 1/2-13NC
108		8	1 1/2	4 1/2	6 1/2					1 1/2-24NF
109		8	1 1/2	3 1/2	5 1/2	948				1 1/2-13NC
110		8	1 1/2	4 1/2	6 1/2	1,134	5	10		1 1/2-13NC
111		8	1 1/2	4 1/2	6 1/2	1,271				1 1/2-24NF
112		8	1 1/2	3 1/2	5 1/2	948			3	1 1/2-13NC

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STAMPS

DETROIT
TAP & TOOL CO.

8432 BUTLER
DETROIT 11
MICH. U.S.A.



Zagar V-H Holding Fixtures

ting oil forced through fixture via tapped hole.

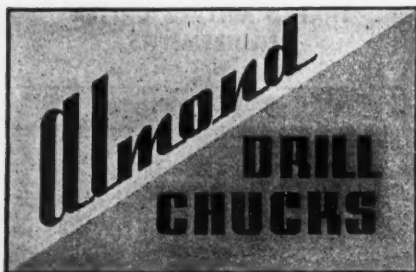
The design of the Zagar V-H Holding Fixture also includes an alloy steel collet bushing which is case hardened to provide hard wearing surface and is ground to very close dimensions. Tapped holes are furnished in the fixture for mounting drill bushings.

Tool, Inc., 23880 Lakeland Blvd., Cleveland 17, Ohio. The fixture, which is said to be ideal for drilling and tapping cross holes in round stock, is ruggedly constructed to provide for long life.

The body is cast of Meehanite and has two right-angle faces into which key slots are milled in two directions to enable fixture to be located in various positions on drill press or milling machine table. Work is lubricated and chips washed away by means of cut-

"Dustkop" Medium Duty Dust Collector for 25 or 50 Cycle Current

A self-contained portable "Dustkop" dust collector built especially for operation on either 25 or 50 cycle alternating current but otherwise employing the same cyclone separator and filter combination as the standard Model 950 "Dustkop" dust collector, which is suitable for medium duty grinding, burring,



● The Almond Three Jaw Drill Chucks were the first to be placed on the market. They were Pioneers in the field of Drill Chucks!

ALMOND THREE JAW DRILL CHUCKS are furnished in 9 sizes with capacities from 3/16" to 1". These are made in heavy and light duty types with a taper arbor hole or with a threaded arbor hole. For Portable Drills.

Write for Complete Details.

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T. R. ALMOND MFG. CO.

ASHBURNHAM

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the Zagar
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Dust Col-
Current

"Dustkop"
for opera-
alternating
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filter com-
Model 950
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g, burring.

• •

G. CO.
S. M. W. L.

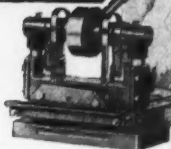
August, 1944

METAL Stampings

DUPLICATED
WITHOUT
DIES

With DI-ACRO Precision Machines

If you desire to save time and critical materials on production of metal stampings or other small parts, learn the DI-ACRO System of Metal Duplicating Without Dies merits your consideration. It is based on the rapid and accurate production of formed parts with DI-ACRO Shears, Brakes and Benders. All duplicated work is accurate to .001". These precision machines are adaptable to an endless variety of work, and ideally suited for use by girl operators. For short runs your parts are processed in a matter of hours instead of waiting weeks for dies.



SHEARS



BRAKES



BENDERS

SHEARS

DI-ACRO Shear squares and sizes material, cuts edges, makes slits or notches, trims duplicated stampings. Shearing width—Shear No. 1—6". Shear No. 2—9". Shear No. 3—12".

BRAKES

DI-ACRO Brake forms non-stock angles, channels "Yees." Right or left hand operation. Folding angle. Brake No. 1—6". Brake No. 2—12". Brake No. 3—18".

BENDERS

DI-ACRO Bender bends angle, channel, rod, tubing, pipe, moulding, strip stock, etc. Capacity—Bender No. 1— $\frac{1}{4}$ " round cold rolled steel bar. Bender No. 2— $\frac{1}{2}$ " cold rolled steel bar.

Send for Catalog

"DIE-LESS DUPLICATING"

It illustrates many stampings or parts made without dies, gives full details on DI-ACRO machines and shows how they may readily be adapted for various applications. Request your copy now.



← Pronounced "DIE-ACK-RO"

O'NEIL-IRWIN MFG. CO.

303 Eighth Ave. So.
Minneapolis 15, Minn.

tapping, and other dust and chip-creating operations, has been added to the line of industrial dust collecting equipment marketed by the Agat-Detroit Co., 604 First National Bldg., Ann Arbor, Michigan.

To provide a necessary minimum fan speed of approximately 3,450 r. p. m., a V-belt overdrive is employed. The fan is mounted on a shaft which, in turn, is located on prelubricated and sealed ball bearings and is driven through V-belt from a pulley mounted on the motor drive shaft. The unit is designed to develop an air speed veloc-

BRADFORD METALMASTER LATHES

14½" - 16½" - 18½" Swing

TOOLROOM AND ENGINE TYPES

.. Also ..

CAM FEED

UNIT TYPE

DRILLING AND

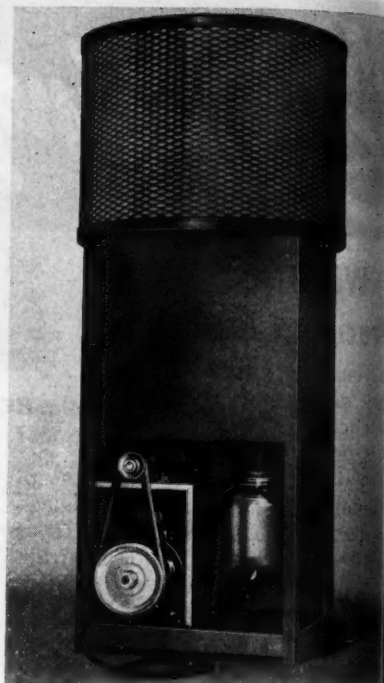
TAPPING
MACHINES



The Bradford Machine Tool Co.

Evans at 8th St.

Cincinnati 4, Ohio



"Dustkop" Medium Duty Dust Collector for 25 or 50 Cycle Current

ity in the inlets of approximately 4,450 feet per minute, which is said to be entirely adequate for collecting most industrial dusts as well as small chips resulting from cast iron tapping and light milling operations.

Available with either one or two inlets as required, the Dustkop can be



KUTMORE ADJUSTABLE HIGH SPEED HOLLOW MILLS

16 standard sizes—Cutting capacities 1/32" to 2". Also specials made to order.

The KUTMORE is the only hollow mill with built-in micrometer dial adjustment. Prompt delivery—even on specials. Write for Catalog No. 15.

CARL WIRTH & SON, 1625 Clinton Ave., N.

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Deliveries NOW Within 30 Days



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small chips
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or two in-
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MILLS**

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also specials

micrometer
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August, 1944

Here's a typical, everyday use for Johansson Gage Blocks—a time-saver that makes real inspection accuracy a simple, rapid-fire operation. Using a stack of Jo-BLOCKS and an ordinary surface gage, set your dial indicator at zero on the blocks—if the work measures zero too, it's *right*. Hundreds of other uses, such as in tool set-up, in laying-out, in scribing, in checking mikes and working gages. Popular Set No. 1, of 81 blocks, makes 1,000,000 different size gages, in steps of .0001

from .200 of an inch to more than 12 inches. Jo-BLOCKS are much lower in price than most folks think. Two grades—accurate to .000004 and to .000008. Deliveries now within 30 days on all standard sets and accessories. Write for catalog 16. Address: FORD MOTOR COMPANY, Johansson Division, Dept. MM, Dearborn, Michigan.


Johansson
GAGE BLOCKS

MODERN MACHINE SHOP 273

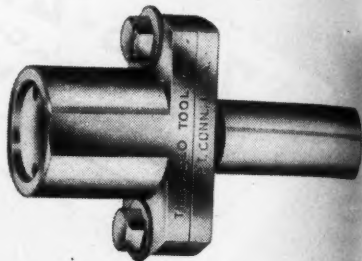
quickly connected to the source of dust by means of standard size flexible metal hose or sheet metal pipe. The cyclone separator employed is constructed to separate the dust from the air automatically, the dust dropping into a glass collecting jar and the air returning to the working area through the spun glass filter material which forms the top of the unit. The high efficiency of the cyclone separator is said to eliminate the necessity for material changes except at prolonged intervals.

The motor for either 25 or 50 cycle operation is available in any standard voltages as required. Thus, the Dust-kop can be connected into the power supplied to the grinder so that both grinder and dust collector can be turned on and off simultaneously.

Alco Combination Roller Stop and Support

A combination roller stop and support for screw machines is announced by The Alco Tool Co., 152 Birdseye St., Bridgeport, Conn. Used as a stop, the unit, due to revolving design, is said

to prevent abuse of work ordinarily caused by roughness, imperfections, and the accumulation of chips. The disc in the stop revolves concentrically



Alco Combination Roller Stop and Support

with the work, with the concentric action quickly adjustable by the floating alignment of the unit. Oil, it is claimed, will not splash when the work contacts the stop since the revolving disc is located below the outside casing.

When the unit is used as a support for long work or for forming operations



PRODUCTO MACHINE VISES

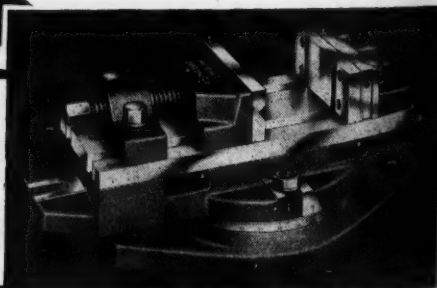
Everything in Machine Vises—from small 3" Drill Press Vise to 9" Heavy Milling Machine Vise including hardened and ground Precision Tool Room and Jig Borer Vises, Plain, Swivel and Angle Vises in various sizes—Quick-Acting Cam Lock Vises for production purposes. All are of modern design and made for rugged wear and accuracy.

Ask for Producto bulletins on Modern Machine Vises and Shop Tools.

Manufacturers of Producto Die Sets and Die Makers' Accessories.

THE PRODUCTO MACHINE COMPANY

990 HOUSATONIC AVE., BRIDGEPORT, CONN.
3017 MEDBURY DETROIT, MICH.



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Oil. It is
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VICES

Drill Press
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Machine Vise

Sets
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August, 1944

MORE WORK [★]BETTER FINISHES
★ LESS TOOL WEAR

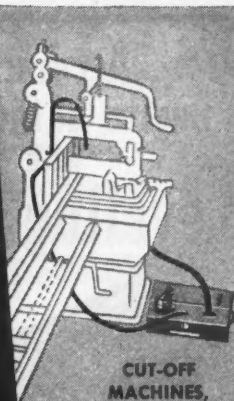
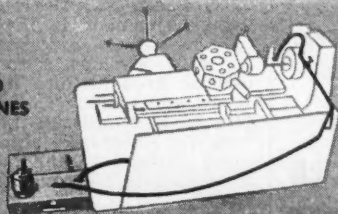
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COOLANT
SYSTEMS**
COMPLETE READY TO INSTALL
\$39⁷⁵ ★ and \$49⁷⁵ ★

NOW you can buy an Atlas Coolant System COMPLETE . . . ready to convert any machine tool into a faster, better production set-up in only a few minutes! Pump, tank, and feed and return system come ready to install on lathes, drill presses, millers, grinders, cut-off saws, screw machines. Attaching brackets and flexible feed lines make the system readily adaptable to any special set-up. Maximum capacities 225 and 450 GPH. Send for catalog.

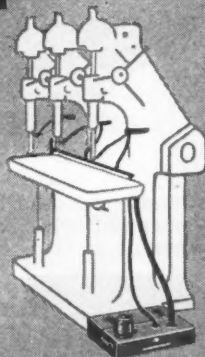
ATLAS PRESS CO.

346 N. PITCHER STREET, KALAMAZOO 13D, MICHIGAN

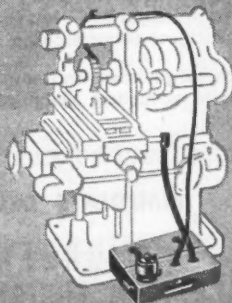
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Screw MACHINES**



**CUT-OFF
MACHINES,
SAWS, ETC.**



**DRILLING
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AND DRILL
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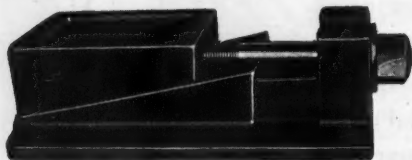


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Accuracy Begins at the Base with Leveling Jacks



Scientifically designed leveling jacks for any equipment which demands extreme accuracy.



Standard Size No. 100A (base 6" x 9", average height 2 3/4", top section 4" x 4 1/2") will fit most requirements.

Extra large base and screw assures permanent accuracy. Angular faces are finished.

SPECIAL SIZES SUPPLIED ON REQUEST.

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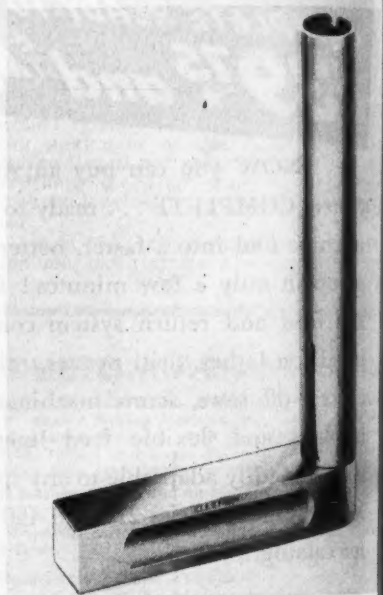
2303 HILTON RD.

FERNDAL, MICH.

requiring maximum accuracy and rigidity, an easy-to-install insert designed to fit the contour of the work being produced is substituted for the revolving disc. The insert revolves exactly concentric with the work and supports it rigidly at the free end.

Ellstrom Master Square

Made to gage block standards for precision industrial uses, the Ellstrom Master Square shown herewith has been developed by the Dearborn Gage Co.



Ellstrom Master Square

22038 Beech St., Dearborn, Mich. The upright member is in the form of a cylinder which is screwed to the base. As wear develops, a fresh new surface can be brought into use by loosening screw and turning the cylinder slightly. Use of a cylinder is also said to provide for increased accuracy since the piece being checked readily makes proper contact against the rounded surface.

All surfaces of the Ellstrom Master Square are hard chromium plated and

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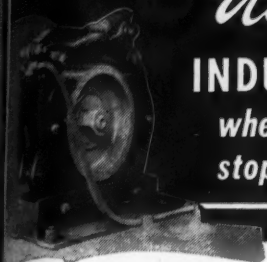
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August, 1944

Use **Wagner** INDUSTRIAL BRAKE CONTROLS

*wherever industrial machinery must be
stopped quickly, safely, and smoothly*



A typical crane bridge-braking system as used on over-
head cranes is illustrated. It consists of an external brake,
which is actuated by a foot-operated cylinder. The same
system has been successfully applied to other machines,
such as bending-rolls, scrap-balers, large wheel-balancers,
and similar applications depending on foot-pressure to de-
celerate the machine for either normal or emergency stops.

A few of the many Wagner industrial-brake controls are
illustrated herewith. Wagner engineers invite the oppor-
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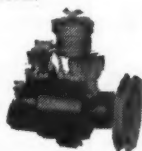
HYDRAULIC ACTUATOR CYLINDER

Transforms the hydraulic-fluid pressure
into mechanical force.



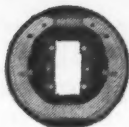
MOTOR and BRAKE UNIT

Each unit is equip-
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expanding shoe-type
brake that is applied
by hydraulic pres-
sure developed in a
foot-operated mas-
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AIR COMPRESSOR

The function of this
unit is to develop and
maintain sufficient
compressed air to op-
erate the air-brake
system and other air-
powered accessories.



TYPICAL WAGNER LOCKHEED INTERNAL BRAKE

Available in
various sizes for application to
some types of industrial machinery.

AIR CYLINDER

Converts the
energy con-
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compressed
air into mechanical force.



POWER CLUSTER

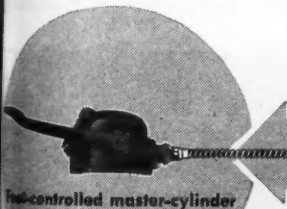
Simplifies
the application of air
power to hydraulic brake systems.



TYPE HM BRAKE

For use on overhead cranes,
whirler-cranes, coke-pushers,
lorry-cars, door-machines, and
transfer-cars, which require

a parking
brake when
out of service
or while per-
forming their
principal func-
tions.



Foot-controlled master-cylinder

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144-13A

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6448 Plymouth Avenue, St. Louis 14, Mo., U. S. A.

ELECTRICAL AND AUTOMOTIVE PRODUCTS



MODERN MACHINE SHOP

277

lapped to finish accuracy of 10 micro-inches. The life expectancy of the unit is said to be further extended by the fact that both upright and base are made of thoroughly seasoned gage block steel. According to the manufacturer, the square is easy to use due to the broad $\frac{3}{4}$ -inch wide base on which the workpiece can be rested. The base, like the upright, is finished to surface accuracy typical of gage blocks.

The Ellstrom Master Square is available in sizes 4 inches (upright measurement from base surface) and up.

T. H. LEWTHWAITE MACHINE CO.

ANGLE CUTTER

MADE IN TWO SIZES:

No. B cuts up to $1\frac{1}{2}$ " x $1\frac{1}{2}$ " x $3/16$ " angles. Wt. 70 lbs.

No. C cuts up to 2 " x 2 " x $1/4$ " angles. Wt. 105 lbs.

All parts are interchangeable and are carried in stock. Rod, flat, and wire rope blades are also interchangeable.

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HAMILTON SWISS TYPE GEAR HOBBERS

...for accuracy
and speed in
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PINIONS,
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TWO MODELS

No. 00 SPUR GEAR
HOBBER for work
up to 2" dia.

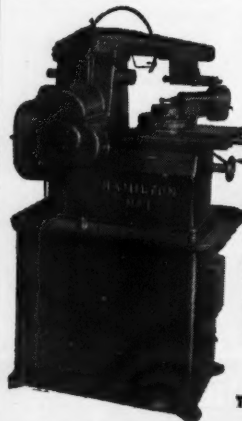
No. 1 SPUR and
SPIRAL GEAR HOB-
BER (Illustrated)
for work up to 6"
dia.

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TRIPLEX MACHINE
TOOL CORP.

Manufactured by
THE HAMILTON TOOL CO.
Hamilton, Ohio

Sales Agents
125 Barclay St.,
New York 7, N. Y.



Topflight Parts Marker

A self-inking, portable hand-operated tool for marking flat and round parts quickly, clearly and accurately to be known as the Topflight Parts

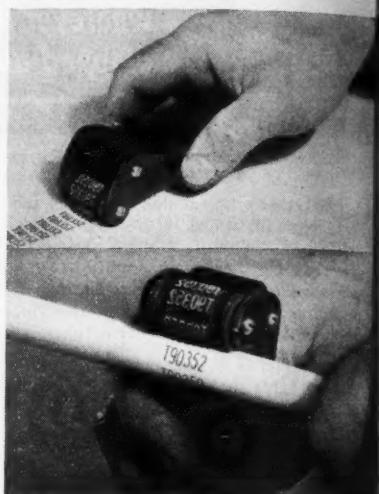


Illustration showing Topflight Parts Marker being used to mark flat and round surfaces.

Marker, is now being marketed by the Topflight Tool Co., Towson 4, Maryland.

Marking of flat parts is accomplished by stroking the mounted type rings of the tool over the surfaces of the part while round parts are marked by rolling in contact with the printing arbor. Single inkings from stamp pad are said to be sufficient to produce over 100 markings. Part number combination



REX RHEOSTAT CO. • Baldwin, N. Y.

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hand-oper
and round
accurately
light Part



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● Wet-Belt Surfacing is taking over many tasks formerly assigned to millers, grinders, shapers, lathes, and is turning out the work faster—5 to 25 times faster—WITH SUPERIOR FINISH.

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● Learn more about it. Mail coupon today for complete information.

PORTER-CABLE MACHINE COMPANY
300-8 WOLF ST., SYRACUSE 8, N. Y.

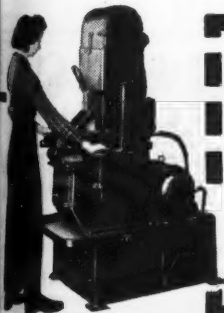
Paris Mark
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REX

Edwin, N. Y.

August, 1944



PORTER-CABLE MACHINE CO.
300-8 Wolf St., Syracuse 8, N. Y.

Mail me free booklet, "A New Precision Machining Method."

Name

Company Position

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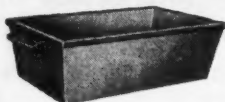
are obtained by arranging type rings on printing arbor.

The Topflight Parts Marker is available with three sizes of rubber type for marking metal, wood or fabric.

Upton Salt Bath Furnace for Heat Treating Cartridge Cases

An unusually large electric salt bath furnace for heat treating cartridge cases has been completed by the Upton Electric Furnace Division, 7450 Melville

New Nesting Type Tote Pans



20" long x 12" wide x 6½" deep.
16 ga., drag holes and handles both ends.

J. L. LUCAS & SON, INC.
Bridgeport, Conn.

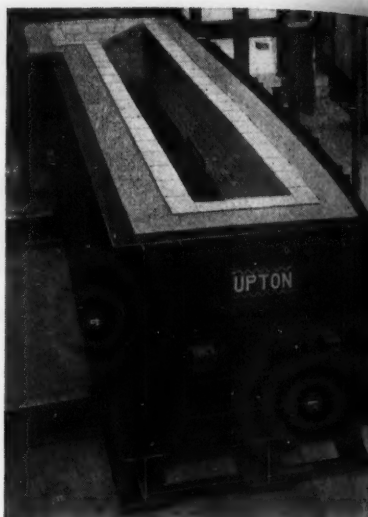
Counterbores High Speed Back Spot Facers Core Drills Flue Sheet Cutters



*Interchangeable
and Solids
Also Specials*

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BICKNELL - THOMAS COMPANY
GREENFIELD • MASSACHUSETTS



Upton Salt Bath Furnace for Heat Treating Cartridge Cases

at Green, Detroit, Mich. Having a size of 21 feet long by 56 inches wide and a working depth of 21½ inches the furnace is designed for use in the full annealing of cartridge cases on a continuous production heat-treating basis.

According to the manufacturer, uniform heating of the salt is accomplished by the correct spacing of a series of sealed electrodes and the proper application of electric current. The electrodes, which extend through the furnace from the outside where connection is made to transformers, are arranged so that their inside surfaces are

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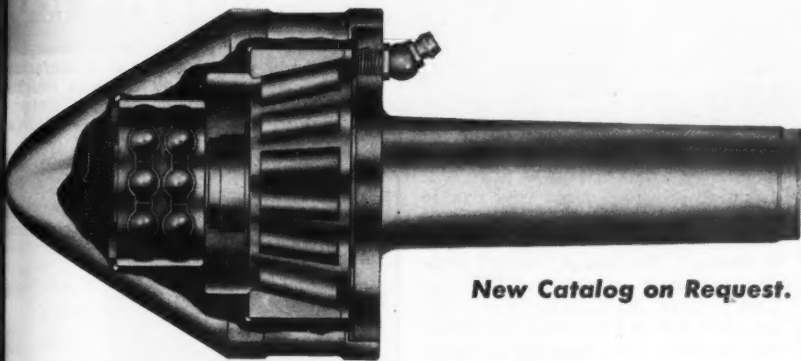
THE CINCINNATI GEAR CO.
Wooster Pike Cincinnati, Ohio

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MARVEL TOOL & MACHINE COMPANY

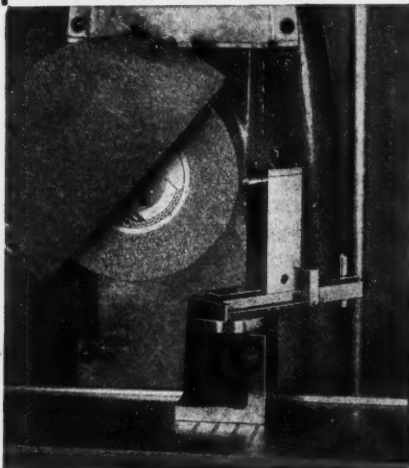
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RIVER ROUGE 18, MICHIGAN

The FORM-MASTER ANGLE AND RADIUS DRESSER



An all-purpose angle and radius dresser for high-precision at low cost. Accurate easily within .001". Simple to operate. Dresses in vertical position enabling operator to SEE the form in work. All parts hardened and ground (except cast-iron base which can be drilled and tapped). Suitable for surface and cylindrical grinders. Two $\frac{1}{2}$ ct. diamonds and instrument case included—\$150.00 complete.

It readily produces: Any desired angle; Convex radii to 4"; Concave radii to 7"—on 7" wheel.

Specifications: Base 3"x3", height 8 $\frac{1}{2}$ "; Wheel capacity 10"; Angular travel 3".

For information or a demonstration

CALL YOUR SUPPLIER

Manufactured by

J. & S. TOOL CO.

477 MAIN ST., EAST ORANGE 5, N. J.

PRECISION DRESSING TOOLS

flush with the bricking which forms the interior surfaces of the walls and floor of the pot itself.

The molten salt is said to be held at a temperature of approximately 900 deg. F. Power for heating the salt is provided by means of three phase alternating current passing through six transformers which are connected to the six electrodes in the furnace—the transformers being used in pairs rather than singly for greater efficiency of operation.

Referring to the illustration, the offset at the far end of the furnace is provided so as to permit a conveyor to return the work through the bath without lifting it out of the molten salt.

"University" Surface Finish Comparison Standards

A set of surface finish comparison standards which enables manufacturers to specify and check surface roughness has been developed by the University Machine Co., University Rd., Cam



"University" Surface Finish Comparison Standards

bridge 38, Mass. The set consists of 25 specimens with roughness range of from two millionths of an inch (rms) to 500 millionths of an inch (rms). The blocks are stainless steel and include representative specimens of all ordinary machine tool operations, such as polishing

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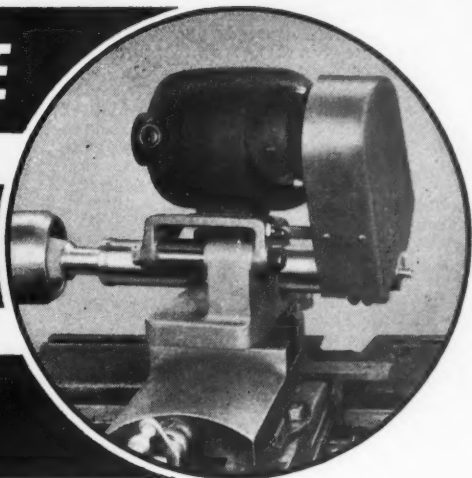
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August, 1944

A PORTABLE

TOOL POST

GRINDER



FOR LATHE • SHAPER • PLANER MILLER OR BENCH WORK

This universal type tool-post grinder meets tool room and production demands for close tolerances and perfect finishes at high speed. High speed motor provides plenty of reserve power. Static and dynamic balance assures vibrationless performance.

EXCLUSIVE LEMPCO QUILL ADJUSTMENT

Both the motor and the grinding quill are adjustable 2" in or out, giving you the equivalent of two different length quills—without the expense. Saves set-up time on jobs using different length quills.

INTERNAL • EXTERNAL • FACE • TAPER GRINDS

Quill mounted in four pre-loaded, matched sets of ball-bearings.

Two-step "V" pulley provides spindle speeds of 6,000 to 13,000 R.P.M.

WRITE FOR SPECIFICATIONS

COMPLETELY EQUIPPED

Choice of 16" or 18" grinding quill. 6 wheels consisting of one 3" cup type and 5 recess type wheels from 3/4" to 4" diameter. Universal type dresser bracket and mounted diamond; spindle extension. Snap switch with 10 foot electrical cord, and heavy wheel guard. Comes packed in solid wood storage case.

LEMPCO

3717 DUNHAM ROAD
MIDDLETOWN, OHIO, U.S.A.

August, 1944

MODERN MACHINE SHOP 283

grinding, turning, shaping, milling, and so on. Each specimen is engraved with the machine operation and micro-inch reading.

The roughness of a machined surface can be readily checked by machinist or inspector by comparing the standard specimen with the part under test. The human fingernail drawn across the surface is said to be sufficiently sensitive to detect roughness differences of only a few millionths of an inch.

"University" Surface Finish Comparison Standards are furnished in felt lined walnut case having individual compartments for blocks.

Keller Pneumatic Ratchet Wrench

Designed for difficult nut-running in close quarters, a pneumatic ratchet wrench of rugged construction is now being manufactured by the Keller Tool Co., Grand Haven, Mich. The side plates, which support the socket, are milled with slots the entire length of the plates to provide accurate align-

ment and rigid support for the socket. The nose of the wrench is designed for insertion into very close quarters.

Double strength in the pawl is accomplished by constructing it with two



Keller Pneumatic Ratchet Wrench

ratchets engaging the teeth of the socket and with two compression springs for balanced pressure at point of contact with the ratchet. The cam is lubricated from the same fitting as used to grease the rotor and gears.

Powerful and durably made, the Keller Pneumatic Ratchet Wrench is available in three sizes with sockets for use on nuts from $\frac{1}{4}$ to $\frac{3}{4}$ inch. In all three sizes, the tool has a head clearance not exceeding $\frac{1}{2}$ inch. Sockets are broached through so that by merely turning the wrench over, it can be used for both removing and tightening nuts.

RENEWED *or* NEW SURFACE PLATES



Swanson Seasoned Surface Plates are made in 24 standard sizes to 36" x 60" —special sizes to order. Wood covers and handles included with each plate.

• SWANSON Seasoned Surface Plates are available in 24 standard sizes and special sizes to order. However, we can make your old Surface Plate like new again, or if it is too worn to be reconditioned, we'll make a good allowance for it towards a new Swanson Plate. Just write us before you send your old plates. Our principal business is precision machining and toolmaking, so we know the value of an accurate Surface Plate. Write for instructions and price list.

SWANSON
TOOL AND MACHINE PRODUCTS, ERIE, PA.

for **QUICK**
change-overs

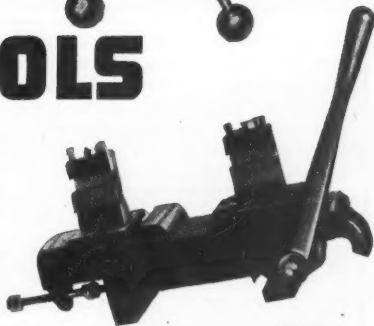


\$197.50
Immediate
Delivery

UTILITY TOOLS

In a matter of minutes you can convert your engine lathes into screw machines. Simply remove tail stock and install a Utility Turret and Crossfeed Cut-off. Turret has rack and pinion which assures steady feed. Raised bearing surface eliminates all chip trouble. Has two taper gibs for take-up and alignment. All ways and bearing surfaces are ground. All inserts, bushings and pins are hardened and ground. Hex is $5\frac{1}{8}$ " across flat, $2\text{--}7/16$ " thick. Accommodates a $\frac{3}{4}$ " hole or a No. 1 or 2 Morse taper. Fits Logan, South Bend, Atlas, Craftsman, 10" Sheldon, Clausing, etc. Cross Slide pictured here has rack and pinion, two tool holders with adjustable jacks. Weight approximately 40 lbs.

Collet Closer parts are hardened and ground. Full ball bearing. Only wear is on ball bearings. Write for detailed literature.



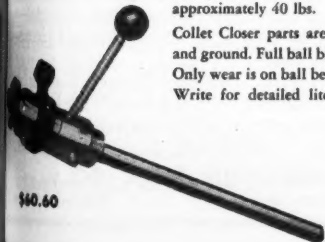
\$55.00



TOOL and DIE MFRS.

1370 West Washington Blvd.

LOS ANGELES 7, CALIFORNIA



\$60.60

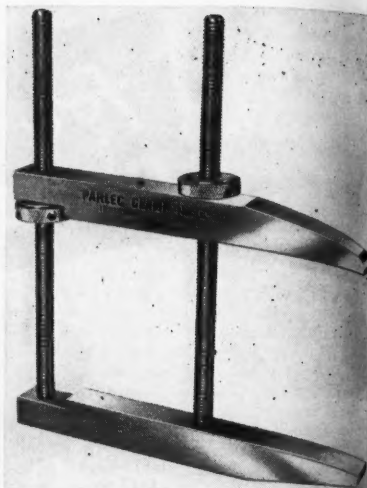
August, 1944

MODERN MACHINE SHOP 285

Parlec Clamp

A clamp for holding small workpieces during tapping, drilling, and so on, is now being marketed by Earl C. Parkhurst, 751 Stepney Place, Inglewood, Cal., under the trade name of Parlec.

The clamp is of unusually simple design, consisting of two case hardened steel jaws, two case hardened steel adjustment nuts, and two heat-treated steel studs which are solidly fastened into the lower jaw of the clamp. One of the adjustment nuts is screwed onto the rear stud beneath the upper clamp



Parlec Model No. C-20 Clamp

jaw, while the other adjustment nut is screwed onto the front stud above the upper jaw. Thus, the upper jaw is movably controlled by the two adjustment nuts, the front nut acting as a pivot and the rear nut exerting the gripping pressure. Both nuts have pin holes for quick and easy hand adjustments. A quick turn of the rear nut releases pressure instantly.

Jaws are tapered on the ends to allow clamping under a shoulder or recess. Since the lower jaw has no obstruction the clamp can be fitted very close to the part or parts to be held. When drilling a part, the clamp may be used as a base.

The Parlec Clamp is available in the standard sizes designated as the Model

"ALL-WAY" LEVEL



The FELL Precision Level is made to show the level of all ways at once. This eliminates disturbing the first level when leveling the second. Graduations are in .0005" per foot and form squares about a circular bubble, thus giving co-ordinate readings and showing direction and amount of slope, if any.

MADE IN TWO SIZES

5 1/2" x 12"

3 1/2" x 6"

Write for Bulletin

WM. B. FELL CO.

702 SOUTH ST.

ROCKFORD, ILL.



A REAL HELPING HAND

It's a help that die makers, tool makers, machinery builders and general machinists have long sought—a more accurate and surprisingly faster way of transferring blind screw holes.



The Heimann Transfer Screw Set is a self-contained, complete tool. No wrenches or pliers are necessary. Made in 1/8" to 1" diameters. Send for price list.

HEIMANN MFG. CO.

330 Lincoln Ave.

Urbana, Ohio

JOHNSON'S

Adjustable Limit SNAP GAGES



MODEL A



MODEL B



MODEL C

E. JOHNSON CO.

Keep down your gage costs by using these fast, accurate gages. Reset when necessary. Also: Flat and Cylindrical Plug Gages, Built-Up and Solid Snap Gages, Flush Pin and many other types of gages.

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FOR
DETAILS.

Factory:
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Avenue
Pequannock, N. J.

**Why Use A Shaper
to cut Keyways when a**

**DAVIS
KEYSEATER**

**will do the
job so much
quicker
and
better?**

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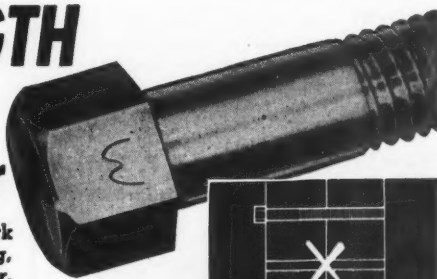


DAVIS KEYSEATER CO.

Exchange and Glasgow Sts.
ROCHESTER, N. Y.

EXTRA STRENGTH

Can Save Time and Labor



When three screws can do the work of four, five or more, they save drilling, tapping and assembling time and labor. They speed production and cut costs.

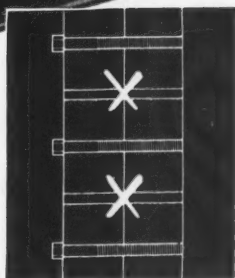
Mac-it Hexagon Head Cap Screws are heat-treated for maximum strength and toughness. This extra strength can be used to provide ample holding power with fewer screws.

The Mac-it "m" on the hex head is your guarantee of quality. It appears on all diameters $\frac{1}{8}$ " to $\frac{3}{4}$ ", inclusive.

OTHER MAC-IT PRODUCTS INCLUDE:

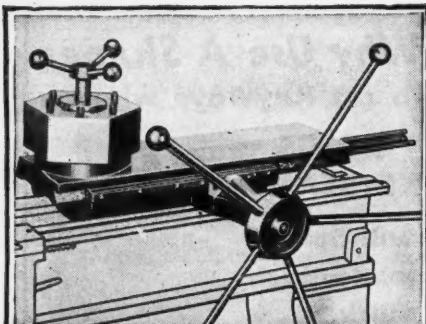
Hexagon Socket Cap Screws, Hollow Set Screws
Hollow Pipe Plugs, Stripper Bolts
Square Head Set Screws

STRONG, CARLISLE & HAMMOND CO., Cleveland, O.



4331

Mac-its
PRONOUNCED
"MACK-IT"



LYNN HEAVY DUTY Self-Indexing CONVERSION BED TURRETS,

Do turret work on your engine lathes! LYNN turret equipment gives you *immediate conversion*. Easily, quickly mounted on idle or unproductive lathes, enabling them to handle multiple operations rapidly on a wide range of work. Bed Turret models for lathes of all sizes and makes.

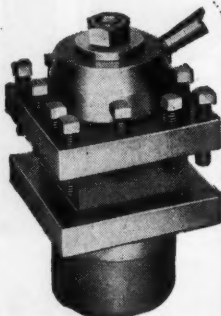
LYNN BT-3 (above), Heavy, Duty, Self-Indexing Bed Turret, for large engine lathes up to 28" swing. 9½" hex head, 10" travel, 6 positions. Equipped with special adjustable base. Also practical for *replacements* on standard turret lathes.

New Precision Model T. P. Turrets

Self Indexing Working Parts Enclosed

For lathes from 9" to 30" swing. Both tee bolt and bolt circle mounting for all types of screw machine and turret base mountings. Performs 4 separate operations in succession with one setup, re-indexing within 1/10 of 1,000.

Write for catalogue



Prompt shipments

LYNN MANUFACTURING CO.

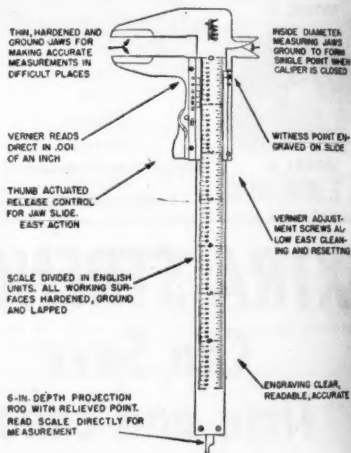
220 Elroy Street

Minneapolis 8, Minn.

No. C-15 and Model No. C-20. The Model No. C-15 is designed to open to 5½ inches and has a jaw length of 6¼ inches, while the Model C-20 can be opened to 6½ inches and has a jaw length of 7¼ inches. Other sizes may be obtained on special order.

Vard Vernier Caliper

A vernier caliper with maximum capacity for full 6-inch inside, outside, and depth measurements is now being manufactured by Vard Inc., 2961 E. Colorado Blvd., Pasadena, Cal. The de-



Vard Vernier Caliper

sign includes a pair of thin, hardened and ground large jaws for making accurate outside measurements and a pair of inside measuring jaws which form a single point when closed. The same scale is used in reading both inside and outside measurements.

For measuring depth of hole, a 6-inch depth projection rod with relieved point is inserted in the hole and the distance from the end of the rod to the body of the caliper read on same scale as used in making outside and inside measurements. The depth rod is an integral part of the caliper.

The Vard Vernier Caliper is constructed of precision ground steel, with

GRAVITY FEED OILING . . . with

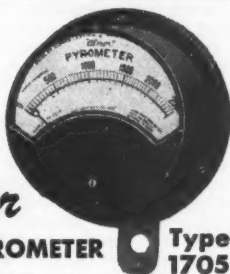
NEEDLE VALVE ADJUSTMENT and SHUT-OFF

Available in several models, and with either glass or unbreakable reservoir, the Gits sight Gravity Feed Oiler permits flow of oil to bearing to be varied as desired by the simple turning of a knurled screw—or completely shut off during idle machine periods. These oilers are particularly adapted to applications of excessive vibration. The styles equipped with unbreakable reservoirs are widely used in the food processing and similar industries. Range of sizes, models and prices furnished on request.

Do you have a copy of the Gits Catalog No. 60?—write for it.

GITS BROS. MFG. CO.
1145 South Kilbourn Avenue • Chicago 23, Illinois

Exclusive for over 35 years



Alnor

WALL PYROMETER Type 1705

Alnor Type 1705 is a dependable pyrometer of moderate cost, built for heavy duty service with heat treating and annealing furnaces, kilns, ovens, melting pots, galvanizing vats, plastic molding and similar equipment. Furnished with standard thermocouple and alloy extension wires. Various standard ranges, 0 to 400 deg. F., to 0 to 3000 deg. F. Thermocouples can be equipped with protection tubes for continuous high temperature service, or in corrosive atmospheres.

Write for Pyrometer Bulletin giving complete data.

ILLINOIS TESTING LABORATORIES, INC.
420 NORTH LA SALLE STREET
CHICAGO 10, ILLINOIS

YOU CAN DO IT—

Faster..Better with

Boyar-Schultz No. 2 Profile Grinder

For fast, accurate, economical grinding irregular profiles, odd and difficult shapes encountered in tool and die work, special machine and development work.

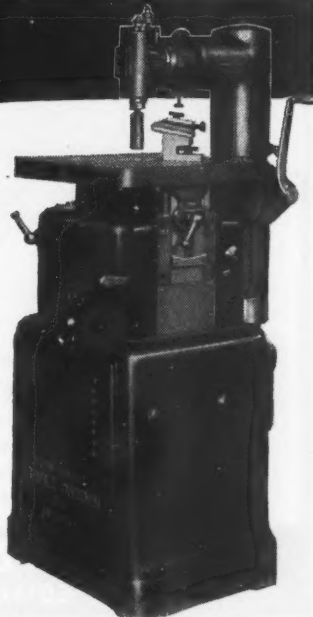
Both independently powered spindles turn at 10,000 R. P. M. removing stock rapidly, even with small diameter wheels. Vertical oscillation reduces wheel wear.

Available in Dual Spindle Model as shown or with Single Spindle. Many users have discovered the value of this machine in production as well as in tool and die work.

BOYAR-SCHULTZ CORP.

1120 WALNUT STREET

CHICAGO 12, ILL.



MODERN MACHINE SHOP 289

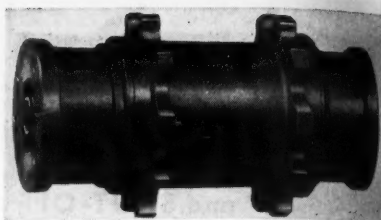
August, 1944

all working surfaces hardened and lapped. Calibrations are clearly marked on caliper face by means of dividing machine, while numbers are engraved for easy reading. One edge of the caliper is divided in 32nds of an inch and the other in 40ths of an inch.

The vernier, which is graduated in thousandths of an inch, is integrally mounted on the slide and is locked in position or released by pressure on thumb lever. Means for adjusting vernier for wear are provided. The design of the caliper also includes a witness point for reading the 32nd-inch scale.

Keystone Improved 50 Caliber Ammunition Booster

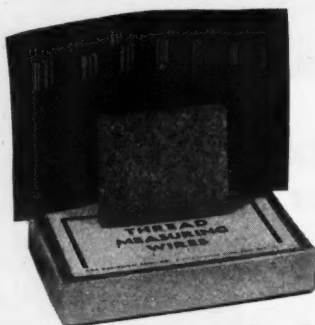
Development of an improved 50 caliber ammunition booster is announced by the Keystone Research Corp., 7720 Male Ave., Los Angeles, Cal. Improvements include an arrangement whereby the sprockets are driven through the use of compressed springs, thus eliminating the old style noeprene shock mount drive and, thereby, greatly lengthening the



Keystone Improved 50 Caliber Ammunition Booster

life of the unit. The weight of the booster has been reduced to below 3 lb. The overall length is 5½ inches; the diameter, 3¾ inches.

The Keystone Improved 50 Caliber Ammunition Booster is designed to operate on 24 volts and, according to the manufacturer, will not draw more than 10.5 amperes under its rated load. The unit is said to have a life of over 50,000 rounds of ammunition and to operate efficiently from sea level to 40,000 feet altitude, withstanding extreme atmospheric temperatures of from minus 70 deg. F. to plus 160 deg. Fahrenheit.



ARCTOOL
PRECISION GROUND

Thread Measuring Wires

A Toolroom Necessity

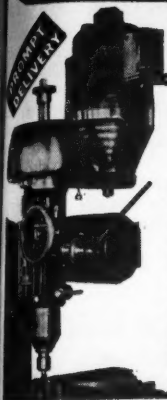
The **ARCTOOL** wire kit offers an assortment of 14 precision ground wire sizes for checking the measurement of any type and size of screw up to 3½ threads per inch. Put up in simulated leather "wallet," the kit comes equipped with cork mounting block and chart of standard screw threads and formulas for determining the pitch diameters of any type of thread.

Price 250

SCHULTZ & ANDERSON CO.

110 EDISON PLACE, NEWARK 5, N. J.

MILLING · DRILLING · BORING
ATTACHMENT for Heavy Duty Operations



EASY MOUNTING

LARGE QUILL—
4" TRAVEL
 (counter balanced,
 hardened, and ground)
6 SPEEDS,
250-3000 RPM.
Lever and Worm Feeds
 $\frac{1}{2}$ H.P. Motor

Specially engineered by
 RUSNOK to meet the de-
 mand for heavier duty end
 mill operations. Use s
 many types of cutters on a
 wide range of work. Large
 size spindle (No. 9 B & S
 taper). Takes $\frac{1}{8}$ " to $\frac{3}{4}$ "
 end mills. Precision Engi-
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Write for descriptive folder.

RUSNOK TOOL WORKS
 3830 North Avenue, Chicago, Ill.

It's a tough worm
says this bird.
ECLIPSE Seamless Flexible Metal Hose
 Manufactured and Sold By
Bendix
 THE INVISIBLE CREW
 Aviation Corporation
 PHILA. DIVISION DEPT. No. 2
 Write for Free Bulletin No. H-201.

NEED GOOD COOLANT PUMPS?

Good pumps PAY. Buy the kind used as standard
 equipment by many leading machine tool manufac-
 turers—BRADY-PENROD. Model 7500, shown
 above, is one of a complete line designed to meet
 every need. It handles all coolant liquids—kero-
 sene, solubles, light and medium oils, etc., 4 to 100
 g.p.m. Tank sizes, 6, 15, 30 gal. or larger, with as
 many hoses and nozzles as required. Discharge pipe
 is cast integral with pump and brought to outside
 of tank. The hinged cover allows cleaning without
 disconnecting return line.

BRADY-PENROD MODEL 7500
 Centrifugal coolant pump and
 tank—a neat, compact unit
 highly suitable for use where
 abrasives are a factor.



All BRADY-PEN-
 ROD pumps have
 heavy-duty stand-
 ard construction
 NEMA motors, $\frac{1}{2}$
 to 1 H.P., any cur-
 rent, phase, cycle.

Brady-Penrod

Incorporated

525 E. Eighteenth St., Muncie, Indiana, U. S. A.
 1945 Santa Fe Ave., Los Angeles, Calif.





Lovejoy Type "H" Heavy Duty Face Milling Cutter

Lovejoy Type "H" Heavy Duty Face Milling Cutter

Lovejoy Tool Co., Inc., Springfield, Vt., has placed on the market a heavy duty face milling cutter designated as

the Type "H." The cutter, which is equipped with 1-inch diameter blades is said to be capable of taking cuts up to $\frac{3}{4}$ inch. The well-known Lovejoy locking principle is employed to hold blades firmly in place, with the blades, however, being readily interchangeable.

The Lovejoy Type "H" Heavy Duty Face Milling Cutter is available in diameters from 6 to 8 inches, inclusive, for shell-end arbor mounting, and diameters 9 inches and larger for spindle mounting. Where applications require, the cutter can be furnished with negative cutting angles. The 1-inch diameter blades are said to provide rigid support for the carbide tips for such applications.

Park Quench Oil Accelerator

According to an announcement made by the Park Chemical Co., Detroit, Mich., ordinary quenching oils can be economically stepped up to the performance levels of fast quenching oils by addition of Park Quench Oil Accelerator—an all-mineral product.

THE UNDER-STRUCTURE IS IMPORTANT TOO!
Smith *Master* Surface Plates are built
to HOLD THEIR PRECISION

The deep elliptical ribbing, exclusive on all Smith plates, assures a maximum of rigidity, a minimum of deflection and long retention of accuracy.

Lapping and planer-finish plates also available. Many sizes in stock. Write, wire or phone.

SMITH TOOL & ENGINEERING CO.

855 N. SANDUSKY AVE.
 BUCYRUS, OHIO



Elliptical Rib Construction exclusive with Smith

Smith Master Surface Plate and Stand

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QUICK DELIVERY
Write for Specification
Sheets and Prices . . .
COLONIAL BUSHINGS, Inc.
145 Jos. Campau St., Detroit

COLONIAL
DRILL JIG BUSHINGS

WHEN EVERY SECOND COUNTS
"THE TOOLMAKERS BEST FRIEND"



This small tool steel job was sawed on the Grob Open End Band Saw in record time. Die illustrated with four openings completed in 12½ minutes including change over from opening to opening.

Write for our catalog full of hints on saving many precious minutes and hours with the help of Grob's exclusive principle of Band Saw set-up.

GROB BROTHERS
GRAFTON, WISCONSIN

August, 1944

The WIGGLER has had its day!



Now CENTER-SCOPE Gets the Play!



There was a time when the wiggler was considered "tops" for positioning a machine tool spindle. BUT, THAT'S NOT TRUE ANY MORE.

The Center Scope is now the fastest method for accurate centering of a machine tool spindle. It has a trimming screw to compensate for spindle run-out, which European-made microscopes do not have. 45X magnification makes it easy to work to tenths.

As a top-flight mechanic, you should own a Center Scope—or, if you feel that the boss should buy one, *put the bee on him.*

Center Scope with Illuminator and Eye Shield.....\$97.00
f.o.b. Milwaukee

Edge Block for use with Center Scope.....\$23.00

For complete details, write Dept. CS (1)

Kearney & Trecker Products Corporation
MILWAUKEE 14, WISCONSIN

MODERN MACHINE SHOP 293

By adding Park Quench Oil Accelerator in a ratio of one to four to oil already in a system, the viscosity, flash and fire points of the original oil are said to be raised slightly while cooling rates for steel are claimed to be definitely increased. Deleterious elements in the original quenching oil are said to be diluted without any stratification or settling out.

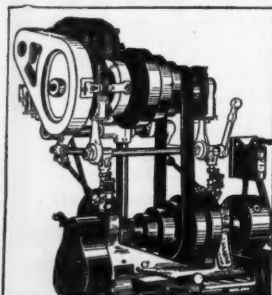
Park Quench Oil Accelerator is said to afford economical means of obtaining maximum oil quenched hardenability from all steels—N. E. grades and standard alloys.

WHITNEY MILLING CUTTERS

*for Uniform Seating of
Whitney Woodruff-type Keys*

No need for skilled labor... or for filing and fitting... when Whitney Milling Cutters are used for seating Whitney Keys. Cutters are made in all sizes to correspond with the keys which can't roll over. Complete information in Catalog V-111. Write.

The Whitney Chain & Mfg. Co.
HARTFORD, CONNECTICUT



Remco brings QUIET

Smooth, quiet, vibrationless power is transmitted by Remco Motor Drives. The motor takes hold by gradually slipping the belt—simple friction clutch action. No noise. Speed changes made without removing tool from cut. No tool marks. Rigid three point suspension, instead of the ordinary one or two points. Drive easily installed, at very low cost. Write to Remco Products Corp., State and Hay Sts., York, Pa.

REMCO MOTOR DRIVES
for LATHES, SHAPERS, DRILLS, MILLING MACHINES, ETC.

Best Tools No. 41 Universal Radius, Angle and Contour Dresser

A universal dressing fixture for the radius, angle and contour dressing of abrasive wheels has been developed by

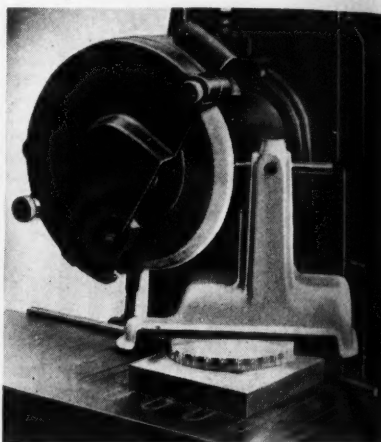
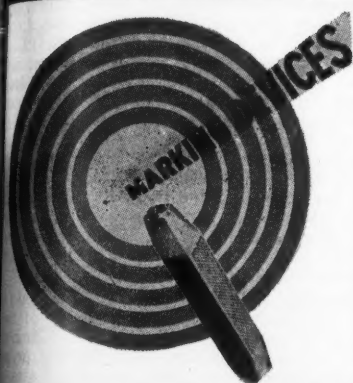


Illustration showing Best Tools No. 41 Universal Radius, Angle and Contour Dresser set up to generate radius on grinding wheel

Best Tools Corp., Rockville Centre, Long Island, N. Y. Designed for quick, easy, and accurate operation by inexperienced workers, the fixture, which is designated as the No. 41, is of simple construction and is provided with a head travel of 2 inches, thus permitting angle and form dressing up to 2 inches and radius dressing from zero to 1 inch concave and zero to 1 inch convex.

For contour dressing operation, a steel

al Radius,
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AND STAMPS LOGOTYPES DIES STANDARD
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MACHINE ENGRAVING PRECISION DUPLICATING

NEW METHOD STEEL STAMPS, Inc.
49 Joseph Campau, Detroit 7, U.S.A.

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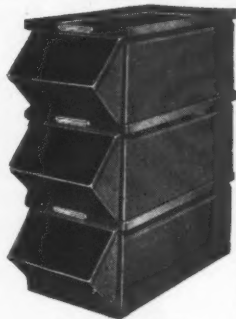
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ES
, etc.

August, 1944

GOOD DELIVERY ON SHOP BOXES

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Shop Boxes
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Stacking
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Stack Units
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Open Front Type*

Special Steel Fabrication in Gauges
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All-Steel-Equip Co., Inc.
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TYPE B—STRAIGHT JAW DESIGN

Adapted for work with short and long bores.

Size No.	Range of Bores Taken	Net Price
1X	$\frac{1}{8}$ " to $\frac{3}{8}$ "	\$10.00
2X	$\frac{1}{2}$ " to $2\frac{1}{32}$ "	11.00
3X	$2\frac{1}{32}$ " to $\frac{1}{4}$ "	12.00
00	$\frac{3}{4}$ " to $\frac{1}{8}$ "	14.00
0	$\frac{7}{8}$ " to $1\frac{1}{8}$ "	16.00
1	$1\frac{1}{8}$ " to $1\frac{1}{2}$ "	18.00
2	$1\frac{1}{2}$ " to $1\frac{3}{4}$ "	21.00
3	$1\frac{3}{4}$ " to $2\frac{1}{8}$ "	29.00
4	$2\frac{1}{8}$ " to $2\frac{1}{2}$ "	40.00

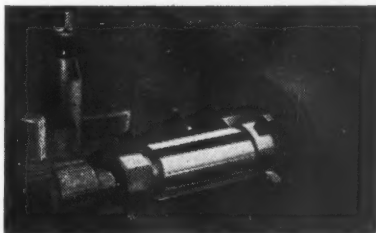
TYPE A—STEP JAW DESIGN

Especially adapted for holding work with short bores while being machined between centers on lathes, grinders, millers, shapers, etc.

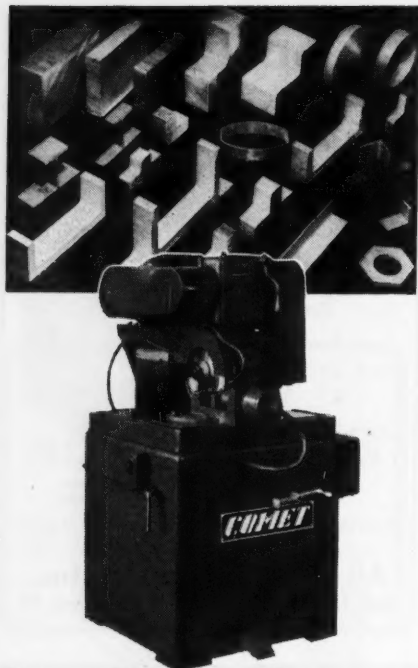
Size No.	Range of Bores Taken	Net Price
1A	$\frac{1}{8}$ " to $1\frac{1}{8}$ "	\$12.00
2A	$1\frac{1}{8}$ " to $1\frac{1}{2}$ "	16.00
3A	$1\frac{1}{2}$ " to $2\frac{1}{8}$ "	23.00
4A	$2\frac{1}{8}$ " to $3\frac{1}{8}$ "	34.00
5A	$3\frac{1}{8}$ " to $4\frac{1}{8}$ "	40.00

W. H. NICHOLSON & CO., 136 Oregon St., Wilkes-Barre, Pa.

NICHOLSON The Standard in E-X-P-A-N-D-I-N-G MANDRELS the world around.



Other sizes taking up to 7" bores. Hardened tool steel, accurately ground. Sold singly or in sets. Prompt delivery. Bulletin No 1043.



CUTS METAL FASTER *More Accurately*

If you require accurate, high-speed cutting of non-ferrous metals and other materials, here is your machine. Cuts by smooth, fast, milling action. Pneumatic hydraulic feed is coordinated with speed of cutting blade. Vise synchronized with action of ram. No vibration because of weight distribution. Has 4 speed transmission and variable feed mechanism. Built-in coolant system. Properly operated, blade breakage is eliminated. Write or wire for free literature.

CONSOLIDATED MACHINERY & SUPPLY CO., LTD.
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COMET
AUTOMATIC CUT-OFF MACHINE
MODEL MH

template of the desired contour is placed on the base of the fixture, the template being held in position by a clamp. The base is then placed against gage on back of magnetic chuck of surface grinder and the dresser head lowered into position so that a spring activated tracer point comes in contact with the template. As the operator turns a knurled knob, the tracer point follows the contour of the template and, in turn, the chisel-pointed diamond of the fixture generates the same contour on the abrasive wheel. To check results, the template is removed and placed against the wheel.

Radius and angle dressing are said to be accomplished in the manner of best shop practice and with unusual flexibility, accuracy and speed. By the proper transposition of the various attachments to the sliding head casting, a great many hitherto unobtainable shapes can be secured quickly and duplicated easily, it is claimed.

A desirable feature of the Best Tools No. 41 Universal Radius, Angle and Contour Dresser is the ease with which it can be disassembled for inspection or cleaning if necessary. The dresser, however, is so designed as to keep all moving parts free from grit.

Mechemel Method for Removing Broken Drills and Taps

A method whereby broken drills and taps can be removed from nonferrous castings and machined parts without altering threads or holes is announced by the Mechemel Engineering & Sales Co., 4313 Lincoln Ave., Chicago 18, Illinois.

The Mechemel Method comprises the use of electrolytic solutions which disintegrate and dissolve the embedded fragments of taps or drills. Certain blocking agents in the solutions are said to prevent electrolytic attack upon nonferrous metals and alloys, thus eliminating possibility of change in hole or thread dimensions. A specially designed electronic unit, operating on 110 volts, a. c., controls the process.

Time required for the operation varies from a few minutes to several hours depending upon the size and length of the broken fragment and the metal in which the fragment is embedded. However, one unskilled workman is said to be able to remove up to three dozen

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Stock sizes range from $\frac{3}{4}$ " to 10" openings, from $\frac{1}{2}$ " to 16" deep. A complete line in all patterns and sizes.



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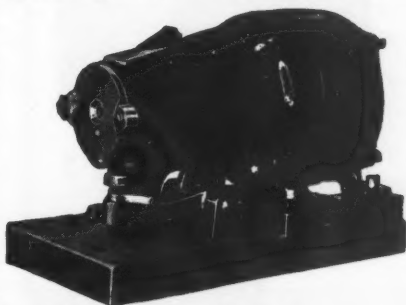
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The CINCINNATI TOOL CO.

SAVES TIME — SAVES MANPOWER and INCREASES Production !

That's what the PRECISION WIRE STRIPPER is doing today for hundreds of war production plants throughout the U. S.—AND IT WILL DO THE SAME THING FOR YOU if wire stripping problems now confront you.

In a twinkling, this ruggedly built precision instrument removes insulation from the ends of solid, stranded or multi-conductor cable and wire up to a half inch in diameter AND IT DOESN'T REQUIRE A SKILLED OPERATOR.



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59 Rutter St.

Rochester 6, New York

taps at one time without constant attendance on the operation. A special formula Mechemel solution for every nonferrous metal and alloy in common use is available by merely specifying the formula or S. A. E. number of the metal being used.

Knu-Vise Model 505 C-Clamp

Designated as the Model 505, an improved C-clamp featuring greater strength and throat capacity, together with marked reduction in weight, as compared with former C-clamp models is announced by Knu-Vise, Inc., 2201 Eighth St., Detroit 16, Michigan.

The use of a forging is said to give the clamp its added strength and allow for streamlining the design, thus permitting a saving in weight of 17 per cent. According to the manufacturer, the resulting better balance makes for greater ease of handling, while the increased throat capacity enables the clamp to be used with wider range of work. The spindle is equipped with wing nut in place of knurled head for adjusting gap clamp for the required thickness of work. The design of the



Knu-Vise Model 505 C-Clamp

clamp is such that necessity for screwing and unscrewing between subsequent clampings is eliminated.



Lead Screw ground from solid AFTER hardening.

CRITERION *Boring Heads*

Original Accuracy Maintained

Noted for maintaining original accuracy over a longer period Criterion Heads are smooth, compact, rigid. Parts subject to wear are hardened. Lead screw is hardened tool steel, with threads ground from solid after hardening. All heads have large, graduated dial. Large offset adjustment eliminates need for offset boring bars. Two sizes: 1½" and 3". ½" and 1" bar capacity. Shanks are interchangeable, enabling operator to use head on different machines. Ideally adapted for slide boring tool holder on small turret lathes. Ask your dealer or order direct. Request free literature.

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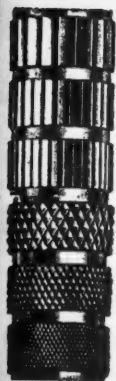
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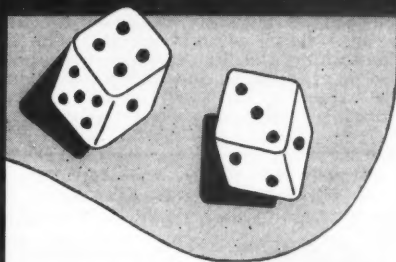
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PRODUCTION DELAY COSTS REAL MONEY!

When any machine goes "Down for Repairs" your production "Jams Up." To get that machine running again may cost only a few hours delay, but—the production lost can mean thousands of dollars.

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Invincible angle tool attachments greatly reduce loss by reaching broken parts without dismantling the machine.

Invincible angle tool attachments make your portable drills universal for any operation by converting them into angle tools in a few minutes.



INVINCIBLE TOOL CO.

6111 Empire Bldg., Pittsburgh 22, Pa.

Makers of Job Tested and Job Proven Tools

General Electric Helium-Shielded Arc-Welding Electrode Holder

A helium-shielded arc-welding electrode holder for manual operation is announced by the Electric Welding Division of the General Electric Co., Schenectady, N. Y. The holder, which may be used with either helium or argon gas, is specially designed for use in the welding of light metals, such as magnesium and its alloys, where precise heat control and protection from the oxidizing effect of the air are required. It can also be used in the

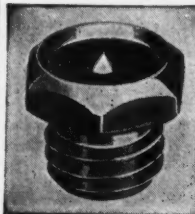
welding of other hard-to-weld metals, such as aluminum and stainless steel.

The holder is light and consists of a comfortable Textolite handle, a steel gas nozzle, and a copper electrode clamp fitted with a tool steel spring-collet. The gas nozzle is designed to give maximum coverage with minimum gas consump-



General Electric Helium-Shielded Arc-Welding Electrode Holder in Use

Accurate Hole Transfer Made Easy With NIELSEN TRANSFER SCREWS



Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. 7 sizes U.S.S. Inexpensive — Last for years. Write for Circular.

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Peerless vertical surfacing machines provide both fine quality of work and speed in surface grinding. Furnished in 9", 14" and 20" sizes, with either belt or motor drive.

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tion, and to avoid obstructing the operator's view of the arc. A fixed angle of 76 deg. between the nozzle and the handle contributes to the balance and "feel" of the holder. The electrode clamp is constructed to hold a tungsten or carbon electrode until all but a 1/8-inch stub is consumed. According to the manufacturer, the holder may be laid down without arcing, since the handle, gas nozzle, and electrode clamp are fully insulated.

A button for controlling the gas sup-

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ALL SIZES AND STYLES



Fabricators of all types of steel shop equipment—Tote boxes, Barrels, Cabinets, Shelving, Etc. Write for general catalogue.

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THE CLEVELAND WIRE SPRING CO. • CLEVELAND, O.

ply valve is located on the handle of the holder, where it is convenient to the operator's thumb. This button will remain in either the "on" or "off" position without being held. It also operates the valve in intermediate positions, thus providing for smooth, stepless control of the gas flow and enabling the operator to conserve helium when welding in a corner or a depression.

A feature of the G-E Helium-Shielded Arc-Welding Electrode Holder is a tapered friction joint between the electrode clamp assembly and the handle which allows for rapid changing of electrodes without using tools or making threaded connections. Electrodes of various sizes may be left in their respective clamps and substitution made merely by removing one assembly from the handle and slipping on another.

Shearmaster Rotary Broach

A tool which is designed to provide a true shear-cutting action for the production of accurate holes with excellent finishes, to be known as the Shear-



Shearmaster Rotary Broach

master Rotary Broach, is now being introduced by the Shearcut Tool Co., Dept. MMS, 19600 Sherman Way, Reseda, California.

Especially constructed for use in floating holder, the tool is provided with spiral or helical cutting edge which, when end pressure is applied to the tool, removes metal in such a manner that chips resembling steel wool in form and texture are produced. According to the manufacturer, the tool, which



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**AUTO MOULDING
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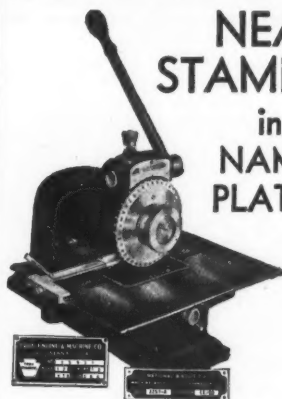
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CHICAGO 16

NEAT STAMPING

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**NAME
PLATES**



Nameplate Detail Press

This machine quickly stamps details
and serial numbers into name plates.

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GEO. T. SCHMIDT, Inc.
1806 Belle Plaine Ave., Chicago 13, Ill.

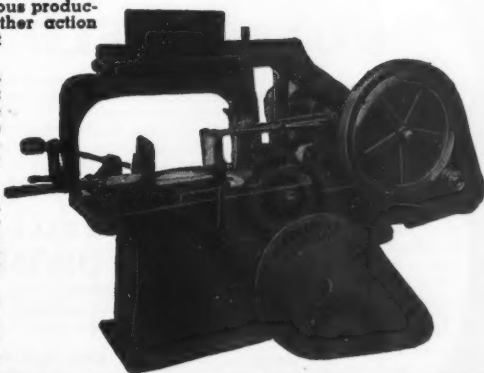
ROBERTSON'S ECONOMY SPEED HACK SAWS

The No. 4X Type Robertson ECONOMY Saw is especially suited for heavy, continuous production metal cutting and gives smoother action and faster cutting. Other salient features include—

- Bronze brushed journal bearings
- Standard stroke of 6" • Automatic stop
- Gravity feed with adjustable pressure blocks • Hydraulic lift on back stroke
- Standardized construction
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Robertson ECONOMY Power Hack Saws are in use throughout the world—more than 30,000 have been installed. Make your next power hack saw a Robertson ECONOMY for speed and accuracy.

Robertson builds a complete line of Power Hack Saws in sizes and types to suit your needs. Send for illustrated folder Form 1-A which gives complete details.



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MACHINE & FOUNDRY CO., INC.

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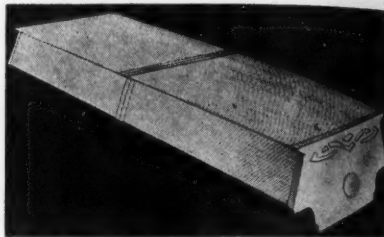
is made of high speed steel, may be resharpened from five to 30 times before being worn undersize.

The Shearmaster Rotary Broach is made with straight shank only in sizes from $\frac{1}{2}$ to 1 inch by sixteenths and from $1\frac{1}{8}$ to $1\frac{1}{2}$ inches by eighths. Larger sizes up to 6 inches can be supplied on special order.

Spero URC-448 Fluorescent Fixture

Designed to comply with latest WPB limitations on the use of metal, the Spero URC-448 Fluorescent Fixture illustrated herewith, product of The Spero Electric Corp., 18222 Lanken Ave., Cleveland, Ohio, is made for four 40-watt lamps, with translucent diffusing glass panels at side and bottom to shield the light source. These specially developed glass panels are said to eliminate all objectionable glare and shadows and at the same time provide for a high degree of light intensity (16 foot candles per watt per square foot under tests).

Constructed to afford the most efficient light distribution, the Spero URC-448 Fluorescent Fixture can be quickly and easily installed, the unit lending itself to three types of mounting — flush-to-



Spero URC-448 Fluorescent Fixture

ceiling, pendant, or continuous-row. Maintenance of the fixture is also said to be simple since the glass panels can be readily removed for cleaning and servicing lamps and wiring is easily accessible from below.

The Spero URC-448 Fluorescent Fixture is available with conventional type

BUTTERFIELD TAPS

You can always rely on Butterfield Taps to give the best possible results at the lowest expense. Butterfield Taps can be supplied in four different grades as follows: 1. Carbon Steel Cut-Thread Taps. 2. High-Speed Steel Cut Thread Taps. 3. High-Speed Steel Commercial Ground Thread Taps. 4. High-Speed Steel Precision Ground Thread Taps.

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URC-448
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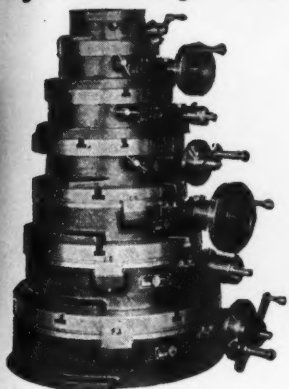


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are practical. They usually pay for
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ballast and starters or with "Insta-Lite" which combines functions of ballast and starter, providing for instantaneous lighting.

Watchmocket Model 7 All-Plastic Industrial Safety Goggle

Designated as the Model 7, an all-plastic goggle for general industrial utility is now being marketed by the Watchmocket Optical Co., Inc., Providence 3, R. I. The one-piece lens con-



M-D Facing Heads

With Automatic Feed

Can be attached to Boring Mill Bar, and Drilling or Milling Machine spindles. Single point tool travels radially, from center outward or reverse, feeds automatically. Sizes 6" to 46" diameter.

Write for circular.

MUMMERT-DIXON CO.

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Watchmocket Model 7 All-Plastic Industrial Safety Goggle



RIVETERS



• Pioneers in the riveting field. Head rivets from smallest to $\frac{1}{2}$ " diameter, either by noiseless spinning or vibrating hammer method.—Sizes to meet all needs.—Types include Vertical and Horizontal Multiple Spindles. Write for literature—and don't forget to send samples.

THE GRANT MFG. & MACHINE CO.
96 Stillman Ave. Bridgeport 5, Conn.

sists of shatterproof methacrylate that is said to withstand heavy impact and is highly resistant to pitting caused by sparks. The curved plastic frame is designed to fit the face snugly but comfortably, shielding the eyes from every angle. A unique construction permits easy replacement of lens.

The Watchmocket Model 7 Safety Goggle is sturdily made to provide for long service and is reinforced with high-brass clip at bridge. Non-fogging and light in weight, the goggle is said to be ideal for women workers. Styles for wearing over prescription glasses are also available.



Cut Set-Up Time

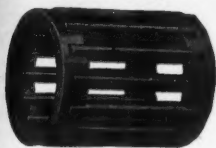
75% through use of the **New Advance Clamps** (the only T-slot clamps). Clamp directly over work. For use on all machines with T-slots. Standard and Heavy-Duty type.

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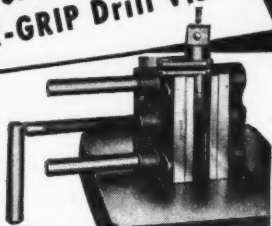
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THE GWILLIAM CO.

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Johnson's
SHUR-GRIP Drill Vise!

\$1550
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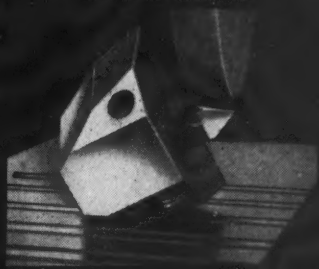
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PLASTIC MOLDS • TOOLS

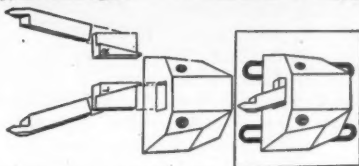
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Only ONE FIXTURE NEEDED to grind both

60° and Acme 29°
Thread-Tool Bits



One Clark Thread-Tool Grinding Fixture handles both National 60° and Acme 29°, left or right hand thread-tool bits with or without rake on the cutting face. Eliminates old method of trial and error. No graduated scales or movable parts to wear. Two sizes available, complete with adaptors: Model A for the mechanic's own tool kit, and Model B for the shop.



How to grind 15° right and left hand bent tools with standard adaptors.

For complete and fully illustrated data on Clark Grinding Fixtures, write for Bulletin MMS-8GF.

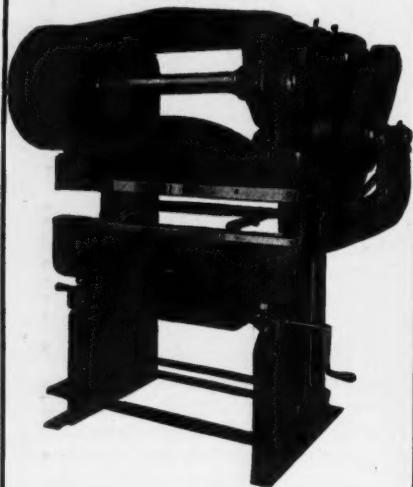
In Canada: DOMINION BEARINGS, LTD.,
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**DREIS & KRUMP MFG.
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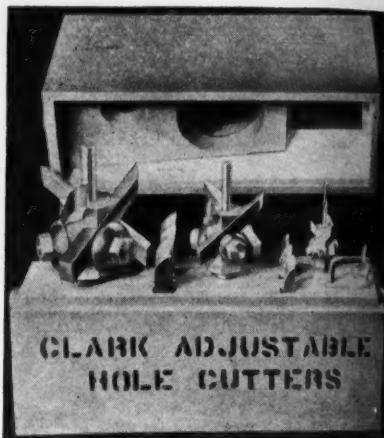
7418 LOOMIS BLVD.

CHICAGO 36

ILLINOIS

Clark Three-Blade Adjustable Hole Cutter Set No. CD-3

Designated as the No. CD-3, a set of three adjustable cutters for cutting holes from $\frac{1}{8}$ to $3\frac{1}{2}$ inches in diameter in aluminum, dural, steel, brass, plastics, fiberboard, and other materials with straight, curved, or irregular surfaces up to $\frac{1}{8}$ inch thick, is announced by the Robert H. Clark Co., 9330 Santa Monica Blvd., Beverly Hills, Cal. The cutters, which are constructed for use as hand tools or in portable electric and pneumatic drills, light drill presses, lathes, and other spindle-type machines.



Clark Three-Blade Adjustable Hole Cutter
Set No. CD-3

are said to produce accurate, clean holes that require no after-grinding, reaming, or filing.

Readily adjustable and designed for easy sharpening and setting, each hole cutter consists of a heat-treated shank with a hexagon body on one end into which are set three high speed steel, precision ground blades at 120-deg. intervals. The smallest of the three cutters has a $\frac{3}{8}$ -inch straight shank, is designed to cut holes from $\frac{1}{8}$ to $1\frac{1}{4}$ inches in diameter, and is equipped with a $\frac{1}{8}$ -inch drill pilot. The second size cutter has a $\frac{1}{2}$ -inch straight shank and can be used to cut holes from 1 to $2\frac{1}{4}$ inches in diameter. The largest hole cutter is available with $\frac{3}{4}$ -inch straight or No. 3 Morse taper shank for cutting holes from 2 to $3\frac{1}{2}$ inches in diameter. The

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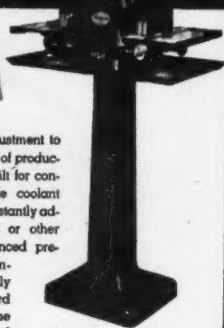
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August, 1944

The CRITERION Carbide Tool Grinder

**GREATER
PRODUCTION
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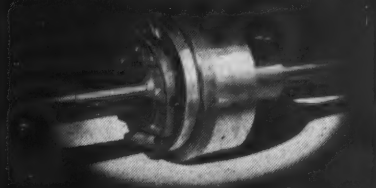


Provides positive rapid adjustment to meet the rigid requirements of production tool manufacturing. Built for continuous service. Adjustable coolant system. Large work tables instantly adjustable without wrenches or other tools. One-third HP balanced precision bearing motor completely enclosed and radially mounted in rubber. Standard equipment: One 60 and one 100 grit 7" dia. steel backed silicon carbide wheels. Ideal for metal bonded or Resinoid bonded diamond wheels.

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SINGLE REVOLUTION *Clutch*

*W*herever extremely accurate control of intermittent machine operation is essential the Hilliard Single Revolution Clutch is unequalled. Its accuracy has won for it the acceptance of industry for cutting, punching and packaging operations.

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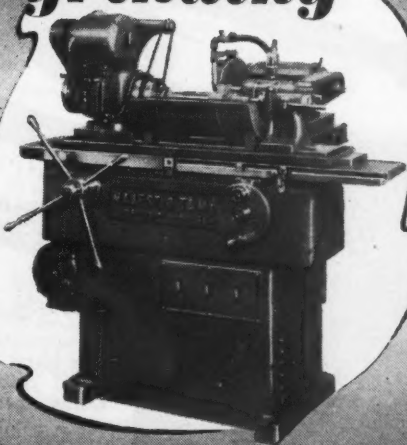
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hardened and ground pilots on the larger sized tools are removable and may be replaced with lead drills if desired.

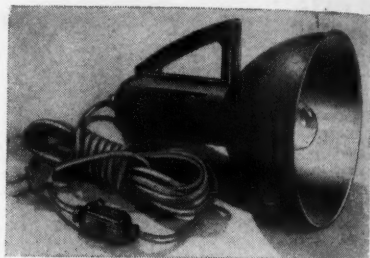
The three adjustable hole cutters, together with an extra set of blades for each, are supplied packed in a handy wooden box $3\frac{1}{2} \times 7\frac{1}{4} \times 10$ inches which is firmly constructed to protect shanks, pilots, and blades when jostled around in a repair kit or mechanic's toolbox.

Fostoria Model LRJ-3 Infra-Red Unit

Designated as the Model LRJ-3, a conveniently designed, hand type near infra-red unit for use where quick, easy, controlled heating is required is announced by The Fostoria Pressed Steel Corp., Fostoria, Ohio. Said to be capable of developing temperatures up to 1,000 deg. F., the unit is supplied complete with 375-watt 110-volt carbon filament infra-red lamp of medium screw base PS-30 type; reflector with gold-plated reflecting surface; cord and plug, and off-on switch. It can be op-

erated on alternating or direct current.

Suggested uses for the Fostoria Model LRJ-3 Infra-Red Unit include melting or flowing grease, pitch, and so on; preheating materials prior to shearing or stamping; preheating small metal



Fostoria Model LRJ-3 Infra-Red Unit

parts to obtain shrink fits; rapid drying or drying off of moisture and liquid coats; certain soldering operations; touch-up paint finishing; heating soldering lugs for electrical connections; and thawing frozen oxygen regulators.

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BORING, FACING & INTERNAL THREADING

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Boring

Int. Threading

For holes from $\frac{1}{8}$ " upward, 15 different sizes.

Made of Super-High-Speed Steel Specially Heat Treated

Indispensable for your JIG BORER. The worm-like spiral of the boring heads provides a long, useful cutting surface. Their use insures perfect fitting threads. Correctly designed for precision work.

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M-B MODEL SS-SR

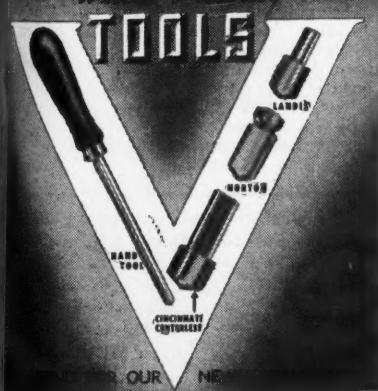


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Here's a new, fast way to patch broken concrete without having to close off the area. Use durable **INSTANT-USE** . . . a tough, plastic material which you simply shovel into hole—tamp—and run traffic over immediately. **NO WAITING.** Bonds tight to old concrete. Makes smooth, solid, heavy-duty patch. Withstands extreme loads. Keep a drum on hand for emergencies. Immediate shipment

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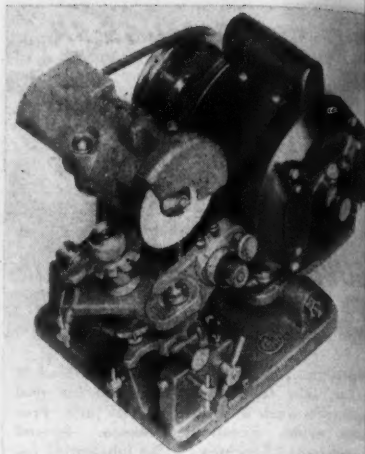
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Company
Address

Waltham Cutter Sharpener

The Waltham Cutter Sharpener shown herewith, product of the Edward Blake Co., 634 Commonwealth Ave., Newton Centre 59, Mass., is designed for the fast, accurate sharpening of cutters used for gear cutting and thread milling, as well as circular form tools, straight fluted hobs, and multiple cutters. Tools may be sharpened radially or with any desired rake angle.

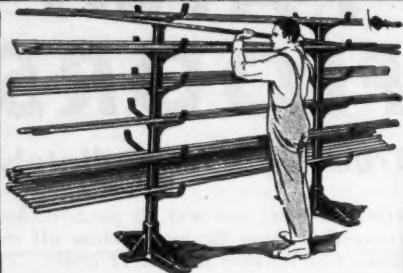
The Waltham Cutter Sharpener has a capacity for cutters up to 2 inches



Waltham Cutter Sharpener

in diameter and $\frac{3}{8}$ inch thick. The machine is designed for bench use and is powered by a $\frac{1}{8}$ h. p. motor which operates on 110 volts, alternating current.

SAVES TIME IN YOUR STOCK ROOM



The BROWN SECTIONAL RACK saves the time wasted end-hauling stock from the old-style, closed-side rack and quickens the selection of sizes by greater visibility. Built of standard metal sections: can be expanded for changes in stock or growth of business. Made in 5 styles: can't burn, depreciation practically nil.

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BROWN ENGINEERING CO.
120 N. THIRD ST. READING, PA.

Sheffield Establishes Type and Size Standards

Type and size standards of air gage spindles for dimensional inspection of internal diameters and bores have been established by The Sheffield Corp., Dayton 1, Ohio, following many years of experience with flow and pressure type air gages.

At present, standards have been

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GROBET SWISS FILES**

Genuine Grobet Precision Swiss Files are world famous for utmost precision and durability since 1812. Learn more about

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Don't let spoilage losses in turning and reaming eat up your profits! Oversize and bell-mouthed holes due to misalignment between machine spindle and work will become a thing of the past when you change over to a Ziegler Floating Holder. Try it and see!



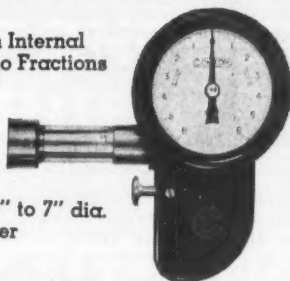
M. M. ZIEGLER TOOL CO.
1924 Twelfth St., Detroit 16, Mich.

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Precision Internal
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Sizes: 1/4" to 7" dia.
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The precision of Comtorplug is independent of errors of human variation. With positive accuracy, it analyzes bores for size, front or back taper, out-of-round, bell mouth, etc., to fractions of .0001". Used at machine as well as by inspectors, it speeds and improves production of precision holes.

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There is a Grobet Rotary File, Cutter, Die-sinkers' Bur in shape, size, and coarseness of cut for every type of hard or soft metal, plastic, wood, etc.

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MODERN MACHINE SHOP 313

August, 1944

up on "Precisionaire" spindles for checking either "through" or "blind" holes ranging in diameter from 0.300 to 1.734 inches, with tolerances from 0.005 to 50 millionths of an inch and less. All spindles within certain size ranges may be used on Precisionaire instruments of corresponding tolerance range. Additional standards are being prepared.

Industrial Super Cut "Zurium"- Bonded Diamond Wheel

Designed to provide long life, a "super cut" diamond wheel in which the diamonds are firmly locked in place by a bonding process known as "Zurium" is announced by Industrial Abrasives Inc., 3724 W. 38th St., Chicago, Illinois.

Under ordinary care in operation, the Industrial Super Cut Zurium-Bonded Diamond Wheel is said to maintain its cutting efficiency even on the most severe carbide tool grinding and finishing applications. The wheel, according to the manufacturer, is capable of grinding several thousand carbide tools.

Starrett "Safe-Flex" High Speed Steel Hack-Saw Blade

The L. S. Starrett Co., Athol, Mass. announces the development of a new hack-saw blade which is especially designed for the sawing of hard materials. Known as the "Safe-Flex," the blade



Starrett "Safe-Flex" High Speed Steel
Hack-Saw Blade

is made of high speed steel which is treated as to combine a soft, flexible back with a hard cutting edge, thus making the blade particularly applicable to severe sawing conditions.

Starrett Safe-Flex Hack Saws are furnished in 10 and 12-inch lengths, the 14 and 18-tooth-per-inch blades with "alternate set" and the 24 and 32

Rawhide





The best "soft" hammers and mallets are Rawhide — tough, resilient, long-lasting C/R mechanical rawhide. They strike effective blows without battering or marring . . . without fatiguing re-coil. They hold their true striking surfaces. Sizes and weights for every need. Hammers are malleable iron with replaceable C/R Rawhide insert faces.

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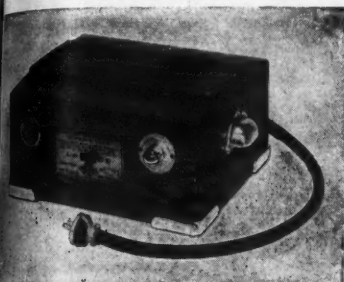
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August, 1944



THE J & H DEMAGNETIZER

FOR ALTERNATING CURRENT

The J & H Demagnetizer requires no counter-
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Precision made of Tool
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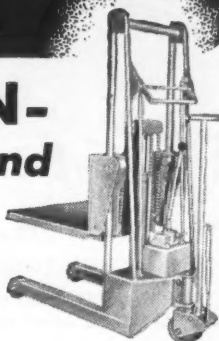
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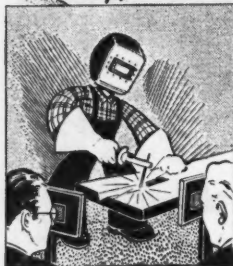
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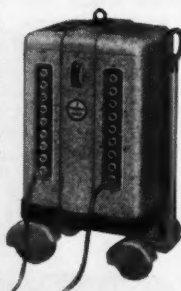
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Corp., 3848 S. 13th St., Milwaukee, Wis. The lubricator can be used on electric motors, pillow blocks, pumps, air conditioning equipment, ventilating fans, gear-boxes, and other equipment having bearings and parts which must be provided with an ample supply of lubrication.

The operation of the lubricator is governed by simple physical laws. When the reservoir is filled with oil, only enough oil is released from the reservoir to raise the level in the bearing oil well to the oil level line marked on the base of the lubricator. When the bearing oil level falls, air is admitted into the reservoir through a vent, thus automatically releasing just enough oil to restore the original level.

The Oil-Rite Type J Constant Level

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rdy red box
identification.

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Lubricator

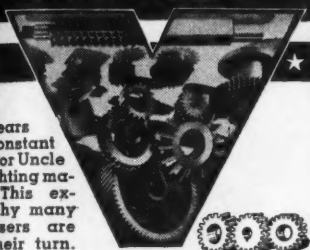
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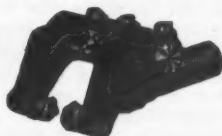
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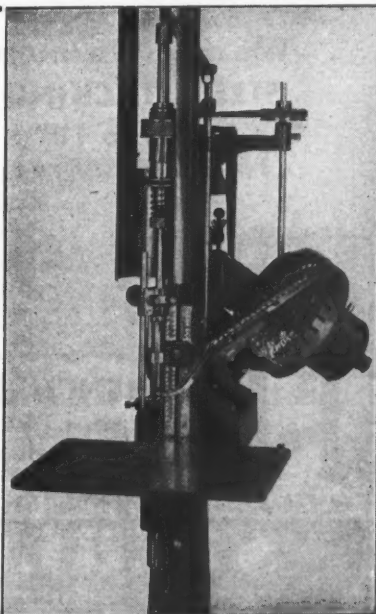
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The Oil-Rite Type J Constant Level Lubricator is available in four standard sizes with capacities of 2, 4, 8, and 16 ounces.



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Scherr "Opti-Flat" Surface Plate

A highly accurate, optically polished, glass master surface plate to be known

as the "Opti-Flat" is now being marketed by the George Scherr Co., Inc., 130 Lafayette St., New York 13, N. Y. Said to be finished to an accuracy of one-half of one ten-thousandth inch, the plate is claimed to have unusual resistance to abrasion and is available

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STEEL STACKING BOXES
Top Rim Type 18" x 12" x 6".
16 Ga. with Drop Handles
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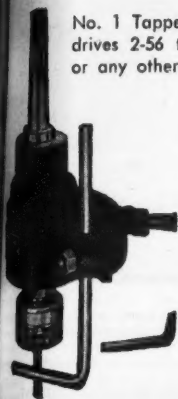
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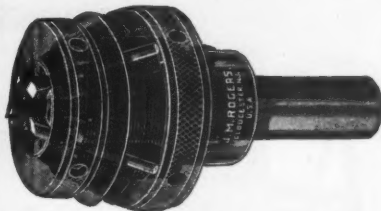
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ROGERS PATENT ADJUSTABLE HOLLOW MILLING TOOL

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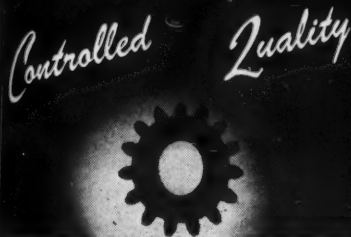
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in 12 and 16-inch sizes with thicknesses of 2 and 3 inches respectively to prevent warpage and breakage.

Inspected by means of optical flats by light interference methods the Scherr Opti-Flat Surface Plate is annealed and free from strain, and will not distort over a period of time, it is claimed.

Lincoln Welding Preheat and Interpass Temperature Calculator

A calculator for readily determining the welding preheat and interpass temperatures of steels in those few cases where experience indicates the need for preheating to obtain best welding results is announced by The Lincoln Electric Co., Cleveland 1, Ohio. The calculator is 6¼ inches in diameter and consists of four movable sections of heavy cardboard stock. Complete instructions for using the calculator are printed in the form of six simple steps on the outside sections.

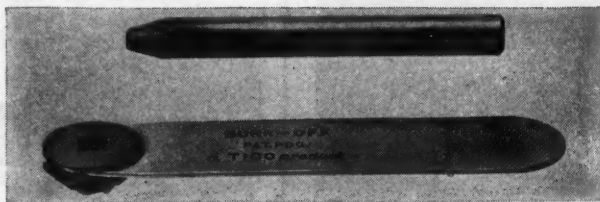
Although most steels are readily weldable and require no preheating because



Lincoln Welding Preheat and Interpass Temperature Calculator

of low carbon and alloy content, the Lincoln Calculator will serve as a convenient guide in instances where steels have high carbon and alloy content and require preheating to minimize the

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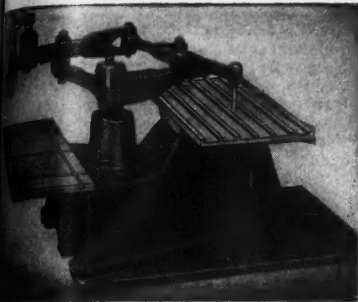
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SEAFORD,

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General Sales Agents:

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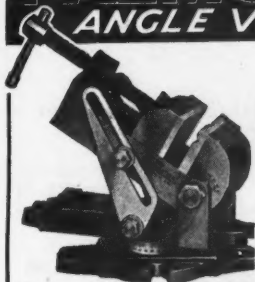
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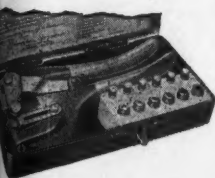
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1" PRESS BRAKE CAPACITY 14 GA. IRON 47 STROKES PER MIN.

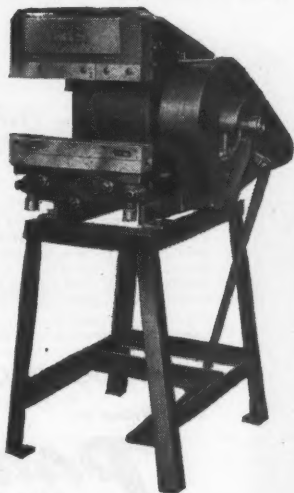
pecially designed to meet the need for a small power-driven brake for moderate-sized work in jobbing and production. Specifications include 1" length of stroke, 1" adjustment, 1/2 hp. motor, 11½" throat height, 6¼" throat depth. Ram and shoes are machined to take standard ½" tongues. Powerful, extremely sturdy, fast, easy to adjust, accurate, with many practical features.

5 Jr. PUNCH



A handy tool for all sheet metal workers. Capacity ¼" hole in 16 ga. iron. Will punch in center of 3½" disc. In metal kit box complete with 7 punches and dies.

Write for New Whitney-JENSEN Punch and Die Chart.



WHITNEY METAL TOOL COMPANY

110 FORBES ST.

ROCKFORD, ILL.

dency toward excessive hardening and possible cracking of the base metal adjacent to the weld.

Schrillo Adjustable Micrometer Stop Countersink

The Schrillo Adjustable Micrometer Stop Countersink illustrated herewith is now being offered by the Schrillo Aero



Schrillo Adjustable Micrometer Stop Countersink

Tool Engineering Co., 8715 Melrose Ave., Los Angeles 46, Cal. Features include adjustments in increments of 0.001 inch without the use of any tool; positive lock to prevent loss of adjustments when in use; self-contained knockout pin which facilitates the removal of taper shank cutters; ball thrust bearing; self-

lubricating long life bearing; and hardened and ground alloy steel shaft.

According to the manufacturer, the Schrillo Adjustable Micrometer Stop Countersink is constructed to render long, efficient, and dependable service under severest working conditions.

Federal Model 120B-1 Micro-Comparator

Designed for production inspection and miscellaneous toolroom use, a combination micrometer head and dial indicator, to be known as the Model 120B-1 Micro-Comparator, has been introduced by Federal Products Corp., 1144 Eddy St., Providence, R. I. Provision of the micrometer head eliminates the need for a complete set of gage blocks for setting the dial indicator to the required dimension. One or two-inch gage blocks (furnished extra) enable the user to set the gage by means of the micrometer to any dimension within 4-inch vertical capacity.

The micrometer head is said to facilitate inspection of thread pitch diameters by the three-wire method and by the usual three-wire formula. An au-



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Saves Blades . . . Increases Production . . .

Cutting speed is gained by pushing against the saw blade. **PADDOCK BALL-BEARING BAND SAW GUIDES** enable workers to crowd work through . . . practically double efficiency of any band saw. Every point of support is a ball-bearing wheel running in same direction with saw. **PADDOCKS** are recommended for use in cutting all kinds of material. Remember—guide wheels are inter-changeable (you can balance wear by switching wheels). Write for full details and prices.

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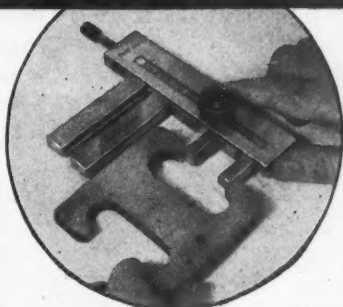
STANDARD D - 4 Abrasive Band Grinder

This new, streamlined bench type grinder assures fast, quality finishing on metals, plastics, wood, fibre . . . at low cost. Built to machine tool specifications, Standard D-4 is equipped with improved band tension control and specially designed protective motor hood. 12x36 1/4" band. The ideal portable unit.

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CONTINENTAL MACHINES, INC.

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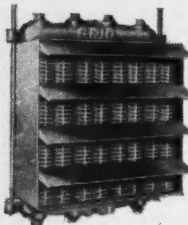
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TO BECOME
LOOSE**

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PIECE
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YOU'LL see a condenser "fin" section (patented) made in one piece of high test cast iron, the metal for permanency...a section that has no soldered, welded, brazed or expanded connections...a section made of similar metals so that electrolysis cannot develop to cause corrosion, breakdowns, or heating failures. There is nothing in it to become loose now or in the future

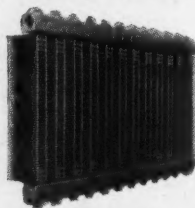
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With the same high efficiency and long life as GRID Unit Heaters — no tortuous air passages — no rupture, strain, or warping — compact — guaranteed for steam pressures up to 250 lbs.

Complete Information upon request.

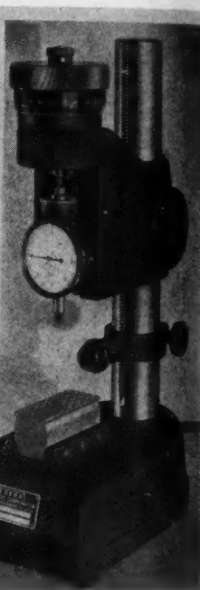
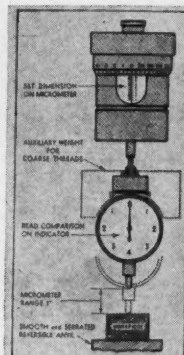
D. J. Murray Manufacturing Co.
WAUSAU, WISCONSIN



GRID

iliary weight provides the additional pressure required for the coarser threads. This weight and a chisel-shaped contact are furnished as extras.

The Model 120B-1 Micro-Comparator is equipped with a Federal super-sensitive low friction dial indicator graduated in 0.001 inch and having high repetitive accuracy. The large diameter of the micrometer thimble permits graduations of 0.001 inch to be provided directly on the thimble.



Federal Model 120B-1 Micro-Comparator

The Micro-Comparator can also be used for direct measuring and with a constant pressure by setting the dial indicator at zero and using that position as a reference. The gaging unit is supported on a rigid 2-inch column and can be quickly adjusted to gaging position by a rack and pinion and handwheel. A brake prevents the head from dropping. A certain amount of lateral adjustment or swing of the head enables the sensitive contact to be set at various positions from edge to edge of the anvil as required. The anvil is of a reversible type—smooth on one side, serrated on the other—and is

Additional
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It's no go, Tojo!

BRING on your Bombers, your Destroyers, your Cruisers and Battleships... they'll all look alike at the bottom of the sea!

And incidently, WHERE IS YOUR FLEET?

Must be you've heard about the accuracy of our Yankee sailors.

Their guns speak a lingo even you can understand.

DON'T COUNT ON A LUCKY BREAK like one of those guns failing in an emergency, because the men of Uncle Sam's Navy don't take chances. **EVERY SHELL IS GAGED** to make sure it fits perfectly in the gun for which it was made.

We, at the Quality Tool & Die Company, know because we make the inspection gages that provide this insurance. So take it from us: **IT'S NO GO, TOJO!**

* * *

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MODERN MACHINE SHOP 325

August, 1944

ground and lapped flat. The backstop is adjustable for height and for depth.

The Federal Model 120B-1 Micro-Comparator has a maximum vertical capacity (sensitive contact to reference anvil of 8 inches and maximum throat depth (sensitive contact to column) of 3 $\frac{3}{4}$ inches. Base dimensions are 6 $\frac{1}{2}$ x 10 inches. The unit measures approximately 18 inches high overall and weighs approximately 62 pounds.

New Method Precision Marking Die

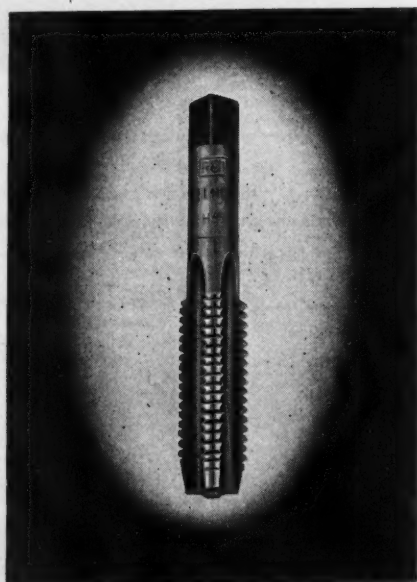
Incorporating all necessary lettering and figures or designs, a simple precision marking die for the automatic machine marking of parts is now being made by New Method Steel Stamps, Inc., 149 Jos. Campau St., Detroit 7, Michigan.

The particular die illustrated is designed for use in a punch press for marking drill cartridge cases for 75 mm. shells. The more than 50 figures and letters engraved on the die were



New Method Precision Marking Die for Drill Cartridge Cases

cut by the New Method pantographic milling process and later hand-finished by engravers.



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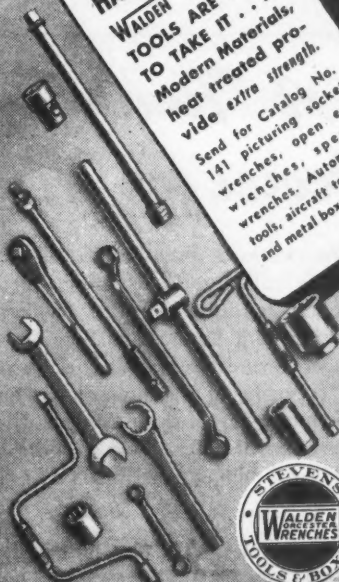
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TOOLS ARE BUILT
TO TAKE IT . . .

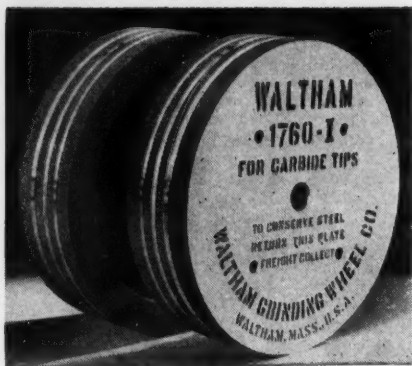
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wrenches, open end
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Waltham Steel Plate Mounted Grinding Wheels

Waltham Steel Plate Mounted Grinding Wheels

The Waltham Grinding Wheel Co., 17 Emery St., Waltham, Mass., is now marketing a line of steel plate mounted grinding wheels for use on carbide-tipped tools. A bulletin (No. 12) listing

complete specifications of these wheels, including diameters, thicknesses, and makes of machines on which they can be used, is available from the company upon request.

Eutectrode 2100

An electrode which is specially designed for use in the quick and easy welding of aluminum sheet and castings, to be known as Eutectrode 2100, is announced by Eutectic Welding Alloys Co., 40 Worth St., New York 13, N. Y. By means of the electrode, metal can be added without completely preheating the casting and particularly without danger of overheating the metal adjacent to the weld, it is claimed.

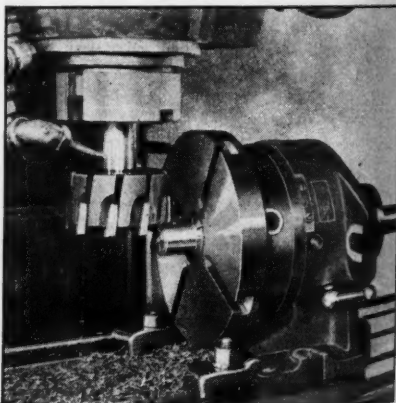
The rod, according to the manufacturer, has been found to be extremely successful in the addition of metal on faulty or improperly machined castings, overlaying of surfaces which have been improperly cast, filling of "low spots," changing of aluminum patterns machined, filling of faultily drilled holes, filling and overlaying of

A Time-Tested Spacing Device for Milling Operations

• The Hartford Super-Spacer, with a draw-in collet and face plate combination is adaptable for Milling, Grinding, Jig Boring and Slotting—at speeds and feeds limited only by the capacity of the holding means and the power of the machine. The illustration at right shows its adaptability for milling bar stock.

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Making **SHORT** work of Long Turns

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The exceptional performance of Kennametal on long cuts works miracles in steel-cutting shops where taper is a bug-a-boo that means, at the best, expensive reworking and finish grinding, and at the worst, a high rate of rejections. Kennametal contains a unique intermetallic compound (tungsten-titanium-carbide) that gives it unmatched hardness. Used properly, it can remove stock from the toughest steel up to $3\frac{1}{2}$ times more effectively than other carbides!

Our engineering staff knows and understands the amazing inherent characteristics of Kennametal and how best to apply them to any specific cutting job. There is an experienced field engineer in your district ready to help you select the right grade of Kennametal, and to determine the proper tool design and the most efficient machine set-up. When these factors are nicely balanced—Kennametal breaks production records!

Get acquainted with Kennametal. Write for our descriptive Catalog 44 that contains information on tool design, use, and maintenance.



porous castings, and welding of casting to aluminum.

Another highly successful application claimed for EutecTrode 2100 is in the joining of aluminum sheet. The extremely high rate of fusion of the rod is said to provide for the production of a smooth, strong, homogeneous fillet with great speed, avoiding distortion and stresses. Joints can be obtained which are entirely leakproof and which are machinable and show high tensile strength comparable to the parent metal.

The rod is shielded with a special

coating which permits its application even without preheating, the manufacturer states. The coating is said to ensure an even and rapid flow of metal. Slag can be removed by simply wire brushing the weld.

EutecTrode 2100 is a high aluminum and low silicon composition which is said to alloy itself to practically every type of aluminum. The rod is made in $\frac{1}{8}$, $\frac{3}{16}$, and $\frac{1}{4}$ -inch sizes and is identified by a long blue tip. It is supplied in packages of 25 pounds.



ARTUS PLASTIC SHIM & FEELER GAUGE STOCK
The COLOR tells the THICKNESS

Long lasting plastic, replaces scarce metal. Each thickness a distinctive, easy to identify color. Impervious to oil. 5"x20" sheets. Special sizes to order. Handy assortment, shim stock, 12 colors—12 thicknesses (.001-.030). Bound together.

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GRAY, Originator of First Practical Metal Cutter or Nibbler

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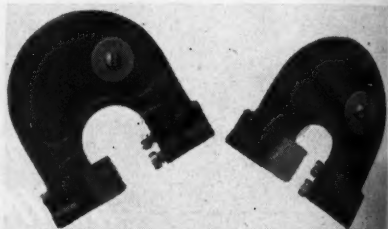


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Atlantic Midget Adjustable Limit Snap Gages

Addition of four midget type models to its Atlantic line of adjustable limit

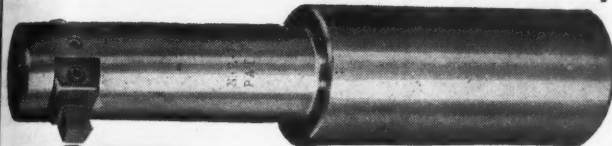


Atlantic Midget Adjustable Limit Snap Gages

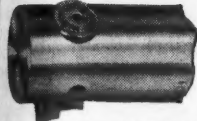
snap gages is announced by the George Scherr Co., Inc., 130 Lafayette St., New York 13, N. Y. Manufactured in accordance with American Gage Design Standards, the midget gages are designed for checking and inspecting extremely small and delicate parts and can be set to handle work from 0.000 to 0.760 inch.

NEW NASH-ZEMPEL BORING BAR INSERT

Micrometer-Adjustable



SHORT PIECES OF
SCRAP TOOL BITS
MAY BE USED AS
REPLACEMENT
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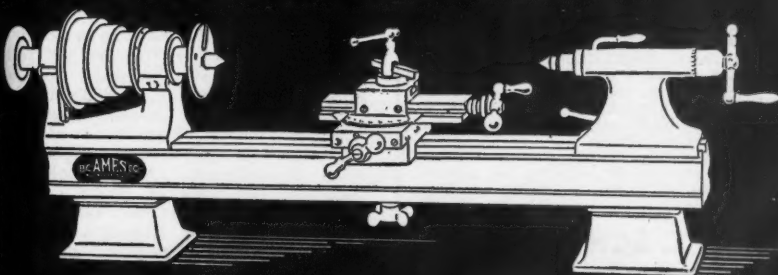
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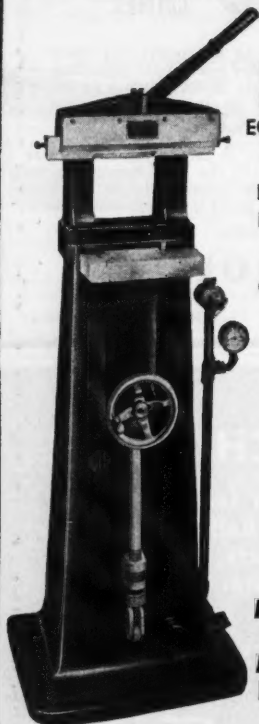
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This machine operates from your plant air line, and is one of numerous models built to produce fast, neat marking on metal parts. Hi-Duty marking machines may be had for practically any marking operation, and we will be glad to make recommendations upon receipt of your inquiries. Send prints or samples of parts to be marked, showing lettering and location, also state required production.

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New Books

Practical Analytic Geometry with Applications to Aircraft. By Roy A. Liming. Published by the Macmillan Co., 60 5th Ave., New York, N. Y. 330 pages. Cloth binding, board covers. Price \$4.50.

The object of this textbook is two-fold: to answer the need for a practical system of analytical calculation techniques for direct use in the aircraft, automotive, and marine industries; to provide the student of mathematics, particularly analytical geometry, with the motivation that comes only with seeing his subjects significantly alive and creative in industrial fields of activity.

Since a good technique in elementary algebra and trigonometry is indispensable to success in the study and application of analytic geometry, the text incorporates in the appendix certain basic formulas from algebra and trigonometry emphasizing the closely integrated nature of these two subjects as tools in the use of the analytic techniques presented.

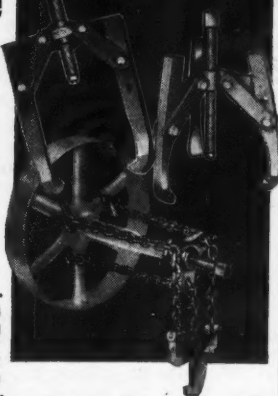
The main body of the text is organized in three parts. Part I analyzes the applications of analytical geometry to two-dimensional space; Part II develops the application of rectangular co-ordinates to three-dimensional space; Part III develops and applies a system of analytic analysis to curves commonly required in the lofting of streamline bodies.

In the interests of unity, applications have been confined exclusively to aircraft structure; however, except for portions of Chapters V and VI, the principles developed apply with equal force and effectiveness to related industrial fields, particularly to certain engineering, lofting, and tooling problems in the automotive and marine industries.

Included in the book is a total of 13 chapters which are headed as follows: Analytic Geometry Applied to Certain Engineering, Lofting, and Tooling Problems; Cartesian Co-ordinates in one Plane; Analytic Equations of a Line; Cartesian Co-ordinates in Space; Typical Co-ordinate Axis Conventions; Analytic Analysis of Basic Lines; Analytic Equations of a Plane; Analytic Analysis of Basic Line-Plane Relationships; Special Analytic Applications; Conic Lofting; Conic Lofting—Continued; Special Conic Techniques; Special Conic Techniques—Continued.

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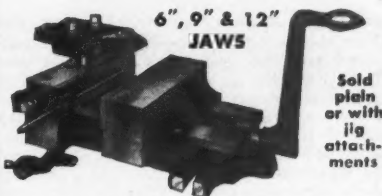
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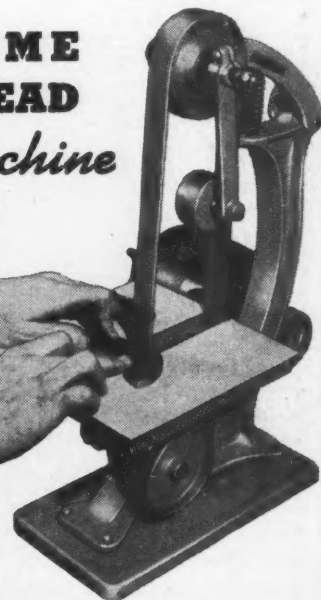
New circular explains, illustrates 18 ways in which the Mead Industrial Burring Machine saves time and money—also contains special Grit Guide. Every industrial plant needs this "Jack-Of-All-Trades" machine. Your burring can be done in "free time" — install these machines by every machine tool which leaves burrs. Grinds, finishes both outside and inside cut-out openings. Immediate delivery in most cases. Write for the informative Money-Saving circular now.



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Fundamentals of Mechanical Inspection. By Rolland Jenkins. Published by McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York 18, N. Y. 179 pages. Cloth binding, semi-flexible covers. Price, \$1.75.

Designed especially for trainees and junior inspectors, this volume is a clearly written, well balanced handbook covering the how and why of inspection. After a review of the purpose and function of inspection, the principles and uses of fine tools and precision instruments are fully discussed and explained. The approach is the result of the author's extensive practical experience supplemented by a long period of classroom instruction in the subject. Extensive use of photographs has been made to illustrate and amplify the text.

Contents of the book are as follows: Mechanical Inspection: What and Why; The Basis of Measurement; The Mechanical Drawing or Blueprint; Tolerances, Limits, and Allowances; The Nonprecision Tools; The Micrometer; The Vernier Instruments; Gage and Gaging; Screw Threads; Dial Instruments and Mechanical Comparators; Air Gages; Accessory Equipment for Inspection; Checking Concentricity; As-

sembly Inspection; The Use and Care of Tools and Instruments; Inspection Procedure; Metals and Materials; Machining Operations; The Mathematics of Inspection; Definitions of Terms Generally Associated with Mechanical Inspection; Appendix: Attainment Test; Answers to Attainment Test Questions; Index.

This volume should not only assist men and women in gaining a better understanding of their function as inspectors but also serve as a ready reference handbook as they progress.

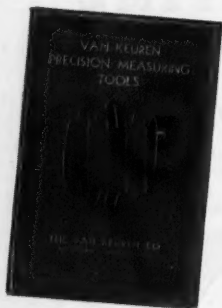
Pictorial Guide to Machine Shop Practice. By H. Grisbrook and C. Phillipson. Published by Emerson Books, Inc., 251 W. 19th St., New York, N. Y. 91 pages, 5% x 7% inches. Cloth binding, board covers. Price, \$1.50.

In this book, the basic principles of machine shop practice are set forth in a unique manner. A series of drawings illustrating both right and wrong ways of performing various operations comprises the bulk of the book.

However, the book is described as more than a series of diagrams, since the captions to the illustrations form a text of concise, easy-to-understand instructions. In addition, the book includes helpful notes on general workshop procedure, the handling of machine tools lubrication, calculation of cutting speeds, milling operations, cutting compounds, and so on.

The book is not only said to be useful for study by the working apprentice but also by the student preparing for more academic study of materials and processes.

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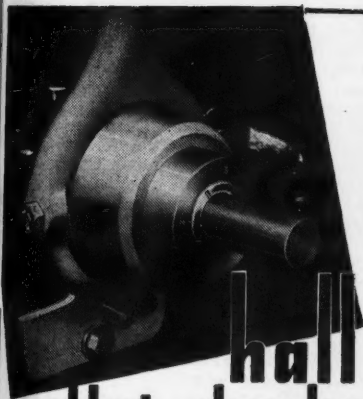
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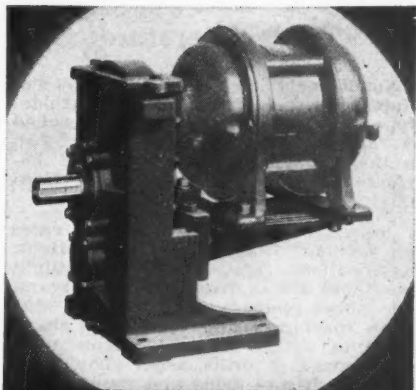
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Trade Literature

Wendt-Sonis Cemented Carbide-Tipped Cutting Tools. Many carbide-tipped cutting tools generally classified as "special" are now listed as standard in the 48-page catalog now being distributed by the Wendt-Sonis Co., Hannibal, Missouri.

Designated as the No. 144, the catalog includes illustrations, descriptions, specifications, and prices of straight and taper shank reamers, spiral reamers, jobber reamers, shell reamers, stub screw machine reamers, straight shank two-flute drills, straight shank twist drills, masonry drills, taper shank core drills, shell core drills and rough reamers, counterbores and spot facers, stub taper spot facers and counter bores, straight shank end mills, straight and taper shank spiral end mills, spiral shell end mills, half-side straddle milling cutters, side milling cutters, staggered tooth slotting cutters, straight and inverted taper shank router bits, lathe centers, grinder half centers, boring tools, taper shank fly cutters, tool bits, roller turning tools, and cut-off tools. Illustrations of special tools are also

included, as well as descriptive and tabular data on how to determine correct carbide grade, safe starting speed, and horsepower required when cutting steel, ferrous, non-ferrous and non-metallic materials.


Copy of Catalog No. 144 is available free to executives addressing requests on their company letterheads.

Construction, Maintenance and Repairing of Aircraft Instruments. By J. A. Gordon, B.Sc., Eng. Reprinted by Henry Paulson & Co., 37 S. Wabash Ave., Chicago 3, Ill., from *Horological Journal*, London, Eng. 32 pages.

This booklet is not intended to be a general treatise on aircraft instruments, but rather in the nature of a correspondence course for watchmakers desirous of entering the industry as aircraft instrument mechanics for the duration of the war. Illustrations are provided throughout to supplement the text.

Subjects covered are as follows: Problems of Design; The Link and Lever Principle; Fuel-Pressure Gages; Oil-Pressure Gages; Pressure Gage Calibrator; Mechanical Engine Speed Indicator; Electrical Engine Speed Indicator; Oil Temperature Thermometer; Radiator Thermometer; Air Speed Indicator; The Boost Gage; Atmospheric Pressure; The Cross-Level; The Longitudinal Clinometer; The Fuel Contents Gage; The Altimeter; Rate of Climb Indicator; The Altitude Recorder; Air Speed Recorder; The Compass; Gyroscopic Instruments; The Turning Indicator; The Directional Gyro; The Sperry-Horizon; The Gyropilot; How the Gyropilot Operates; The Directional Gyro; The Bank and Climb Gyro; How the Gyro Pilot Is Used.

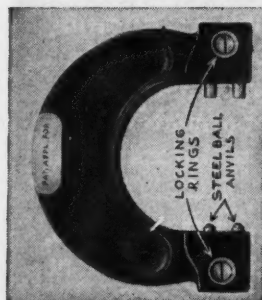
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Equip your shop with Yohe Storage Racks — Save floor space — Prevent damage to stock — Speed up handling. Yohe Storage Racks are cast of high-grade machinery iron and can be furnished in capacities of 10,000 and 12,000 pounds for storing bars 10 to 20 feet long.

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Height to top of collet	5 1/2"	3 1/2"
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Collet capacity	1" round	3/4" round
Cuts per hour on free machining material	1000	1500

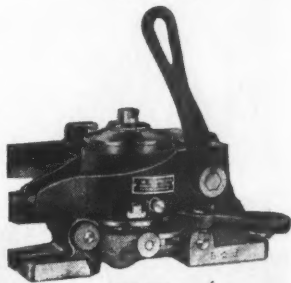
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SMALL BUT MIGHTY WALTON BROKEN-TAP EXTRACTORS



Yes, small in the amount of tool crib space they occupy, but a MIGHTY tool when put to the task of removing a broken tap. Walton Tap Extractors get at those broken taps and complete the job without loss of valuable time.

List Prices from \$1.50 to \$5.00 each.

Simple and easy to operate.
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Write for Folder No. 10.

The WALTON Company
94 ALLYN STREET · HARTFORD, CONN.

Thread Milling Cutter Sharpening Booklet. A 16-page, pocket-size, two-color booklet containing information helpful to faster, more accurate sharpening of thread milling cutters, gear hobs, and so on, has been made available by the Detroit Tap & Tool Co., 8432 Butler Ave., Detroit 11, Mich. Included in the booklet are conversion tables of offset distances for all angles of rake from 1 to 25 deg., in 1-deg. steps, and for all sizes of cutters between $\frac{3}{8}$ and 7 inches O.D., in $\frac{1}{16}$ -inch steps. Offset distances for special angles and other diameter cutters can be computed from a formula given.

Many helpful suggestions on setup, grinding, hook, lead and flute spacing checking, and the prevention of runout and other errors in the sharpening of thread milling cutters are included. Corrections of thread form and pitch diameter errors are facilitated by a section on factors affecting thread form accuracy. Copy of booklet can be obtained free of charge by requesting Bulletin HT-43.

"Where Monel Pays Its Way in Pickling" is the title of a six-page folder issued by The International Nickel Co., Inc., 67 Wall St., New York 5, N. Y., illustrating and describing Monel (nickel-copper alloy) crates, baskets, tanks, and chain and their use in pickling operations. Monel continuous pickling equipment, sheet scrubbers, small wire baskets and rotating drums are also shown and briefly described. Engineering properties and fabrication of Monel are discussed on the back page of the folder. Copy free upon request.

DoAll Hydraulic Surface Grinders. The complete line of DoAll surface grinding equipment, accessories, and supplies manufactured by the Savage Tool Co., Dept. MM, Savage, Minn., is pictured and described in a 20-page booklet now being distributed by this firm. Specifications and application data concerning DoAll hydraulic surface grinders for both toolroom and production grinding are presented. Also included are illustrated information on the production methods used in the manufacture of these grinders and brief descriptions of DoAll chucks, Selectron, coolant unit, coolant oil, dust collector, grinder wheels, precision gage blocks and instruments. Copy free upon request.

SAVE TIME

ON BORING - TOOL SETTING

Take one trial cut, mike it, and use this gage to move the tool the exact additional amount required. Or, working from the O.D. of the bar, set the tool to exact position without a trial cut.

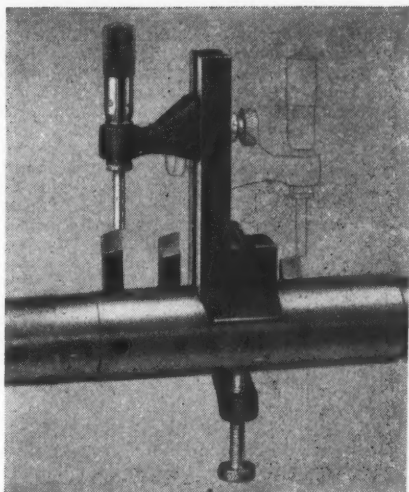
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PEDESTAL MICROMETER

Time wasted in conventional cut-and-try methods can be eliminated. Inexperienced operators learn to do satisfactory work more quickly. Three models available—Model B, with two-slide pedestal, shown.

USEFUL FOR MANY OTHER JOBS

Bartelt Pedestal Micrometers are also excellent for height and depth gaging, for inspection work of various kinds, and for other set-up operations. Write for circular giving full information.



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Get More Production
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MODERN MACHINE SHOP 339

Industrial Washing and Drying Machines for washing, rinsing, slushing, and drying machine and equipment components of every type are the subject of a 12-page catalog released by Industrial Washing Machine Corp., 290 Burnet St., New Brunswick, N. J. In addition to listing standard features of Industrial washing machine equipment and some of the parts that can be cleaned with this equipment, the catalog also illustrates and describes applications of specific Industrial machines, including Model CT conveyor type washing machines, Model CAB-T cabinet type washing machines, Model OM monorail washing and drying units, Model RD rotary drum type machines, and Model VT vertical type washing machines. Copy free upon request.

Muehlhausen Designed Springs. A four-page folder released by the Muehlhausen Spring Corp., 1943 Michigan Ave., Logansport, Ind., illustrates and describes facilities of this firm for the production of large hot-coiled springs. Copy free upon request.

"The Doorway to Satisfaction in Brass" is the title of an interesting 20-page book published by the Manufacturers Brass Foundry Co., 7756 Dante Ave., Chicago 19, Ill. The book is designed as to take the reader on a personally conducted tour through the company's new plant, every step in producing quality brass and aluminum castings being pictured by a series of striking photographs. Copy of book is available to executives addressing a request on the company letterhead.

Farrel Meehanite Milling Cutter Bodies. A 12-page illustrated bulletin regarding Farrel Meehanite Milling Cutter Bodies has been prepared by the Farrel Birmingham Co., Inc., Ansonia, Conn. The bulletin describes advantages of design, tells why Meehanite is used, and explains procedure for preparing the cutter bodies for use and applying the cutting tips. Also included are tables of sizes, shapes, and dimensions of both milling cutter bodies and single point tool shanks. Copy of bulletin No. 27 free upon request.

NEBEL *Geared Head Lathes*

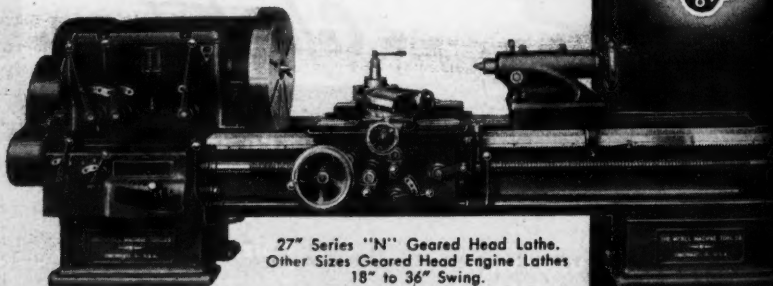
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We also manufacture a line of Removable Block and Extension Bed Gap Lathes.
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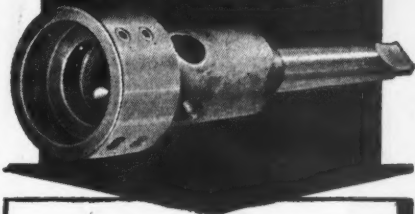
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This useful tool is needed in every machine shop. It's built to hold 1" or 1 1/2" O. D. button dies for chasing threads up to 3/4" x 3" in a lathe or drill press. Whether you have a single piece to thread or a quantity of them, you can do the work faster and better with the Rieger Die Holder. And you don't have to wait! We have on hand ready to ship immediately a supply of Model DH-1512-MT with No. 2 Morse taper shank. Write for literature and quotation.

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GRAND QUICK LOCKSET With Trigger Release

For light, fast production work. Will pay for itself in a few days. Absolutely non-creeping. Trigger release action frees screw instantly with a

single motion for re-setting or permits re-clamping to other work of same thickness without any further screw adjustment. Screw, swivel and trigger release action are COPPER PLATED.

Two models, one for Aluminum and Soft Metals.

GRAND SPECIALTIES CO.

3102 West Grand Ave. Chicago 22, Ill.

TAPPING TIPS

from Woody Spencer's Notebook



The "longer thread, more strength" idea may have its points but most of the fellows I've talked to agree that it's best to design threaded parts so that engagement is $1\frac{1}{2}$ times the diameter with 75% of full thread. This serves to stress the male member before the female thread. It also reduces the trouble ordinarily encountered in excessive thread depth and holds tap breakage possibilities to a minimum. When too much length of engagement is specified, some of them recommend counterboring or relieving beyond the required amount of thread.



"Woody Spencer's Notebook" is our way of trying to pass along ideas and tips we've accumulated through the years we've been making fine taps. Tapping success, however, depends on so many variables that the suggestions we make may not work in every case. We've seen them work enough times though to make us think tapping men may find them worth while.

Almost every tapping operation presents individual problems so we cannot suggest too strongly that you send us complete details of any tapping problem, (material, diameter, depth, etc., etc.) our engineers will be glad to make specific recommendations covering your specific problem.

*Note: Woody Spencer's Tapping Tips will appear here as regularly as "Woody" gets time to write them up. Watch for them.

THE RIGHT TAP AT THE RIGHT TIME

The Wood & Spencer Company
Cleveland 3, Ohio

G-E Low-Speed Synchronous Motors and Control for compressor drives are featured in a four-page illustrated bulletin issued by the General Electric Co., Schenectady, N. Y. The bulletin describes the application of low-speed synchronous motors, emphasizing the necessity of providing in the installation the proper amount of flywheel effect to avoid excessive current pulsations; lists the most important construction features, especially in respect to the rotors and stators; and discusses the synchronization, field removal, and motor protection afforded by the G-E synchronous motor control. Copy of Bulletin GEA-4139 free upon request.

"Eutectic Low Temperature Welding" is the title of a 36-page welding data book published by the Eutectic Welding Alloys Co., 40 Worth St., New York 13, N. Y. The book is packed full with timely facts on low temperature welding for fabrication, salvaging, and general maintenance in all types of war industries and postwar applications. Included are numerous helpful hints on how to increase welding efficiency on all metals using the Eutectic low temperature welding process, as well as complete instructions for easy salvaging of vital war production tools. A special chart which is designed to simplify rod selection and use is reproduced on pages 34 and 35. Copy of data book free upon request.

Aircraft Production Tools. The Hastings Trading Co., Inc., 545 Henry Bldg., Seattle, Wash., is now marketing the aircraft production tools which were developed by the R. H. Park Mfg. Co., Seattle, Wash. A 12-page bulletin regarding these tools is now being distributed by Hastings.

This bulletin illustrates and describes the construction of a 90-deg. angle head with capacity for $\frac{1}{8}$ -inch to No. 30 drill; 45-deg. angle head with capacity for $\frac{1}{8}$ -inch to No. 30 drill; and collet type angle head with $\frac{1}{4}$ -inch drill capacity. The various parts comprising each head are separately illustrated alongside of the completed unit and are designated by number so that they can be checked against a table giving price of each part. Instructions for properly assembling and operating Park Angle Drills and for attaching them to flexible shafts are also included in the bulletin, copy of which is available free upon request.

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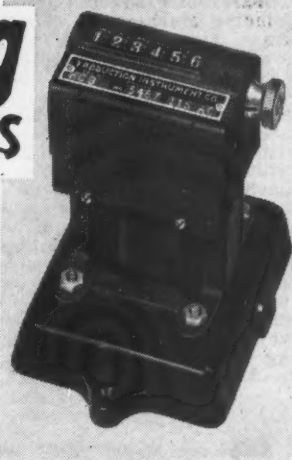


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Wizard Electric Counters count anything that will operate a switch, relay or photo-electric cell. They are being operated by the sound of falling parts. May be located at any distance from the source of count.

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For suggestions tell us what you want to accomplish.



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C-F POSITIONERS

as far as
the eye
can see...

through the light haze of this gigantic welding department extend triple rows of C-F Positioners. From this almost endless production line (the photograph is taken from the half-way point) each day come heretofore unheard of numbers of fabrication with all seams, joints and unions strongly and smoothly welded "downhand."

There are no handling problems or delays, for on C-F Positioners each welder positions his weldment for succeeding welds with a pushbutton control—can rotate it at any desired speed (360°) or tilt it to any angle up to 135° beyond horizontal.

Write for Bulletin WP-22.

CULLEN-FRIESTEDT CO. • 1311 S. Kilbourn Ave., Chicago 23, Ill.

August, 1944

MODERN MACHINE SHOP 343

Geargrind Products Catalog. The Gear Grinding Machine Co., Conant Rd. and Grant Trunk Railway, Detroit, Mich., now has available a catalog containing a series of specification bulletins on its various types and sizes of Geargrind gear, spline and rack grinding machines, internal radius grinders, oscillating grinders, straight and circular groove drilling machines, and worm grinding machines. In addition, the catalog contains bulletins illustrating and describing gear tooth curve indicators, cycle stop and index safety, micro table stop, wheel truing devices, universal spline trimmer, and so on. The contract grinding service offered by the company is also treated in the catalog, copy of which is available to executives addressing a request on their company letterhead.

Nicholson Model "JR" Weight Operated Trap for automatically draining water and oil from compressed air intercoolers, aftercoolers, separators, receivers, and so on, is the subject of Bulletin 341 now being distributed by W. H. Nicholson & Co., 136 Oregon St., Wilkes-Barre, Pa. Copy free upon request.



**PRESSES
FEEDS
AUTOMATIC
EQUIPMENT**

The V & O Press Company, Incorporated
HUDSON, NEW YORK

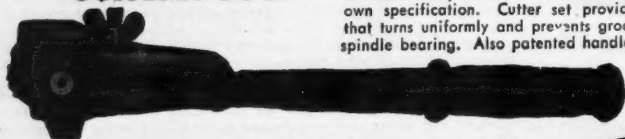
"How to Create Job Satisfaction" is the subject of a man power maintenance manual for foremen, supervisors, and department heads which has been published by the Elliott Service Co., 219 E. 44th St., New York 17, N. Y. The manual is divided into two parts entitled "Giving New Employees a Good Start" and "Making Jobs Desirable."

Contents range as follows: How to Make the New Employee Feel at Home; Explaining Company Policies and Regulations; Giving Safety Instructions; Explaining the Wage Plan; Presenting Promotional Opportunities; Starting the Young Worker on His First Job; Starting a Woman on Her First Industrial Job; When a Former Employee is Rehired; Why Men Become Dissatisfied; Putting Men on the Right Jobs; Building a Group that Pulls Together; Making Working Conditions Satisfactory; Making Jobs Safe; Providing Opportunities to Get Ahead; Handling Grievances Effectively; Are You the Right Kind of a Boss?

"Absenteeism—What Management Can Do to Reduce It" is the subject of a report prepared by the George S. May Business Foundation, a non-profit, non-political, fact-finding organization devoted to research into problems of business management. This report clearly shows that there are two sides to the absenteeism question. One is the case of management; the other the case of labor. Both sides are presented impartially. An impartial analysis shows that practically all of the problems presented by absenteeism can be solved by intelligent management and supervision.

Copy of Report No. 144 is available to executives addressing requests on their company letterheads to the George S. May Business Foundation, 111 S. Dearborn St., Chicago, Illinois.

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The Champion Dresser will outwear many cheaper dressers . . .
a fact proved for years by thousands of shops.

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A mechanically correct dresser with cutters made of steel of our own specification. Cutter set provided with revolving sleeve that turns uniformly and prevents grooving of spindle. Patented spindle bearing. Also patented handle cap that serves as bearing clamp, eliminates set screws and eliminates moving parts that wear.

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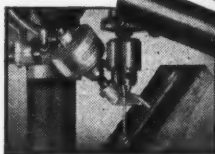
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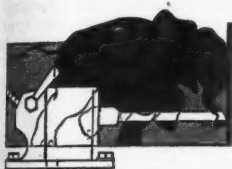
MEAD AIR CLAMP

Wherever a drill comes down, *something must hold the work*. Wherever a drilling-jig is required, *Air-Clamp* will simplify it. Wherever *speed* is desired, *Air-Clamp* will produce it. *Air-Clamp* holds with relentless pressure; it is undisturbed by size variations (such as in casting), it scoffs at vibration (how many drills have been broken due to faulty hold-downs?), chatter, snagging. *Air-Clamp* holds work of any size or shape in any position, at any angle. Can pay for itself on a single fixture; saves its cost on a few days' drill-press output. Reduces operator fatigue. Saves hours and dollars in drafting-room, jig department, tool room and production line. *Air-Clamp* fits any drill-press having a cylindrical column. Special fixtures for Tee-slotted tables, light milling work, etc. Hand and/or foot control. Shipped on approval to responsible concerns. Write for new Air Power Catalog.



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Drill Press
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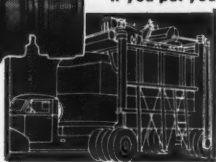
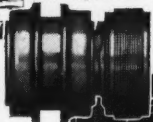


MEAD SPECIALTIES COMPANY
15 So. Market Street Dept. 84-AA Chicago 6, U.S.A.



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Your peacetime products can be improved by the ingenious solutions to war material handling problems, if you put your



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provide easily adapted, compact power transmission control for machine tools and many types of material handling equipment that are speeding production and avoiding wasted man-hours.

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They show how PULLMORE Multiple Disc CLUTCH exclusive features are being used to give post-war products competitive advantages. Give capacities, dimensions and specifications. Contain application diagrams and photos of PULLMORE equipped machines.



Rockford Drilling Machine Division

Borg-Warner Corporation
300 Catherine St., Rockford, Ill.

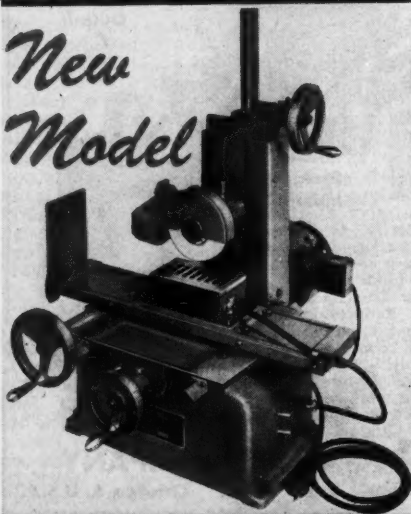
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**HIGH SPEED
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SANFORD MFG. CO.

**1279-81 SPRINGFIELD AVE.
IRVINGTON 11, NEW JERSEY**

Richard Brothers Product Catalog EE. Richard Brothers Division, Allied Products Corp., 1560-74 E. Milwaukee Ave., Detroit 11, Mich., has issued a 46-page wire-bound catalog presenting its complete line of standardized interchangeable piercing punches and dies, punch and die retainers, rubber strippers, die sections, guide pins, guide pin bushings, oval wire springs, spring pilots, dowels, screws, and stripper bolts. In addition to providing illustrated, descriptive, and tabular information on these various products, the catalog includes a hardness conversion table, table of decimal equivalents, and other helpful data. Copy free to executives upon request.

Morse Silent Chain Drives. Designed to supply postwar planners, design engineers, plant production men, and purchasing agents with the most recent and complete information on Morse Silent Chain Drives, an 80-page bulletin prepared by the Morse Chain Co., Ithaca, N. Y., is now ready for distribution. In addition to the usual specifications and price lists, the bulletin includes entirely new material covering the advances and new developments made in the high speed chain drive and other fields.

The newly compiled material includes a section on new and simplified methods of drive selection based on latest Morse practice in high speed drive design, and a complete section of engineering data covering chain and sprocket construction, together with a comprehensive list of stock drives based on a new, quick method of selection. The bulletin also includes a more complete section on installation and maintenance, as well as condensed data covering other Morse power transmission equipment, such as roller chains, flexible couplings, and free-wheeling clutches.

Copy of Bulletin 43 is available free of charge to executives addressing requests on their company letterheads.

Kaufman Tapping Machines. The L. J. Kaufman Mfg. Co., Manitowoc, Wis., has issued a four-page bulletin presenting information on its line of "Hi-Duty" tapping machines. Included are pictures of single and dual spindle tappers, special machines and fixtures, together with specifications, data on principle of operation and special features of Kaufman "Hi-Duty" Tapping Machines. Copy of Bulletin No. 828 free upon request.

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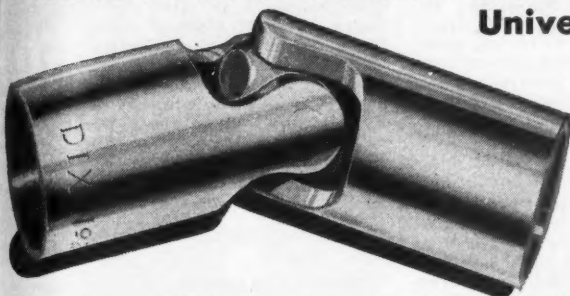
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August, 1944

"World's Finest Precision Ground Universal Joints"



DIX

**PRECISION-
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Wherever perfect-functioning joints are required—Dix Precision-Made Universal Joints will give the utmost performance and satisfaction. Let Dix engineers help solve your problems.

DIX Universal Joints come in 15 standard sizes, from $\frac{3}{8}$ " to 4" Hub Diameter made to Army, Navy, Air Corps spec. AN-40236 ready to install, or can be made to customer's specifications. Eliminate "rejects" with DIX Universal Joints! Write, wire for catalog, prices, specifications, etc.

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No. 27

Describes and prices standard tungsten carbide tools and tips. Valuable charts of proper cutting speeds for various materials. Special tools and gages.

No. 41

Covers the full line of Willey's diamond tools, diamond and mechanical wheel dressers. Illustrates proper methods of caring for diamond tools.

WILLEY'S CARBIDE TOOL CO.

SOLE MAKERS OF WILLEY'S METAL

1342 W. Verner Highway

Detroit 1, Michigan

August, 1944

MODERN MACHINE SHOP 347

Heller Tool Catalog No. T-44. Heller Brothers Co., Newark 4, N. J., has prepared a 28-page catalog containing illustrated, descriptive, and tabular information on available tools, including chisels, hammers, tongs, wrenches, punches, blacksmiths' tools, and general tools. Copy of Catalog No. T-44 free upon request.

Pangborn Industrial Type "CK" Unit Dust Collector is the subject of a four-page bulletin, designated as the No. 910, which is now being issued by the Pangborn Corp., Hagerstown, Md. Features and construction specifications, together with the capacities and dimensions of the three sizes available are completely covered by the bulletin, copy of which can be obtained free upon request.

Holden Neutral Baths for hardening and tempering are fully covered as to advantages, operation, characteristics, applications, and so on, in a 28-page profusely illustrated bulletin now being issued by The A. F. Holden Co., New Haven 8, Conn. Copy of Bulletin 110 free upon request.

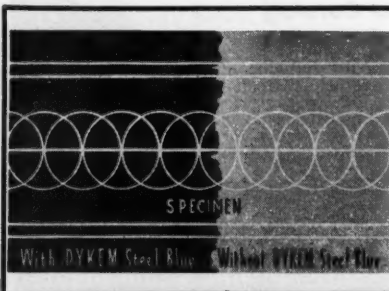
P&H "Zip-Lift" Hoist Instruction Bulletin. A four-page bulletin prepared by the Hoist Division, Harnischfeger Corp., Milwaukee 14, Wis., contains instructions on what to do before installing, before operating, and on general care and maintenance of P&H "Zip-Lift" Electric Hoists. It also explains how to use a Zip-Lift properly so as to keep it functioning efficiently without interruption in service. Copy of Bulletin J-711 free upon request.

"How You Can Obtain Power Tools" is the title of an eight-page bulletin now being distributed by the Boice-Crane Co., 937 Central Ave., Toledo 6, Ohio, covering the Boice-Crane Purchase Priority Plan—a convenient plan, especially designed for shopmen and home craftsmen, whereby power tools may be obtained at the earliest possible moment and payment arranged out of patriotic savings in War Bonds. Copy free upon request.

Alnor Instruments. A four-page bulletin now being distributed by Illinois Testing Laboratories, Inc., 420 N. La Salle St., Chicago 10, Ill., illustrates and briefly describes single and multi-point types of pyrometers for wide range of service; specialized types of portable pyrometers for foundry service; electrical resistance thermometers, and air velocity meters. Copy of Bulletin No. 2982 free upon request.

Larco Diamond Tools. Designed for convenient filing, a folder containing a number of sheets with questions and answers concerning Larco metal bonded diamond impregnated wheels has been prepared by Larco Diamond Tool Co., 551 5th Ave., New York 17, N. Y. Also included in the folder is an illustrated price list of Larco metal bonded diamond impregnated wheels, tools, saw blades, hones, and standard universal cutters for lenses.

Copy of folder is available to executives upon request. Additional sheets for insertion in the folder will be issued from time to time.



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Stops Losses in Making Dies and Templates

Simply brush on, right at the bench; ready for the layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and accuracy.

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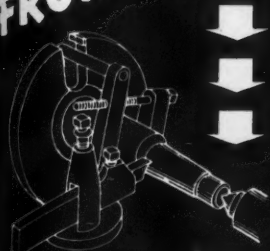
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on the DEAD CENTER

Dixon's Lathe Center Graphite Lubricant . . . combines lubricating flake graphite with an extreme pressure lubricating compound. It possesses almost super-film strength. As a result of these advantages, it reduces the chances for overheating, reduces wearing or scoring of dead centers, steady and follower rests and jack screws.

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**Universal Drilling
Machine with Multiple Head**



Standard Machine above is arranged with Baker flange quill spindle construction and was furnished to a leading radial engine builder, complete with a special fixed center multiple head and work holding fixture. This machine is used for machining lightning holes in master connecting rods for radial aircraft engines. The flexibility of this machine lends itself to multiple and single spindle drilling operations. Wide range of spindle speeds and feeds obtainable instantly—conveniently mounted levers make operation easy.

Send for circular 314 A.

BAKER BROTHERS, INC.
TOLEDO 10, OHIO

August, 1944

MODERN MACHINE SHOP 349

Cleveland Catalog No. 2010-A on Cleveland Steelweld Bending Presses is being issued by The Cleveland Crane & Engineering Co., Wickliffe, Ohio. Included are numerous photographs showing various applications of these presses, as well as details of construction. A complete table of sizes and dimensions is also included.

In addition, the catalog presents detailed data on Cleveland Steelweld Bulldozers, including dimensions and other information on the most popular sizes. Copy of Catalog No. 2010-A free upon request.

H-P-M "Closed Circuit" Operating System. A four-page folder now being issued by The Hydraulic Press Mfg. Co., Mount Gilead, Ohio, illustrates and describes how H-P-M Hydraulic Presses for sheet metal forming, drawing, forging, powder metallurgy, coining, die-casting, and other operations requiring controlled high pressures, achieve their fast, shockless, operating cycles. Copy free upon request.

Air Cooled Grinding Wheels. A six-page folder now being distributed by Air Cooled Wheel Corp., 1500 Walnut St., Philadelphia, Pa., illustrates and describes a unique open porous structure grinding wheel that is said to cool itself and is adaptable for use on all types of grinding machines for grinding a variety of materials. Copy free upon request.

Hal-Har Surface Plates. A six-page folder presenting information as to the features, construction, available sizes, and price of Hal-Har Surface Plates has been prepared by the Hal-Har Tool & Equipment Co., 38 Chauncy St., Boston 11, Mass. Copy free upon request.

"Common Sense vs. Dermatitis" is the title of a four-page folder now being distributed by Jones Medical Laboratories, Inc., 800 Huron Rd., Cleveland 15, Ohio, describing four Jones' products for eliminating skin trouble — Neo-Film, Jones' Skin-Kreme, Zomine, and Zolamide. Copy free upon request.

HALLOWELL

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In the "HALLOWELL" line of steel work-benches there are 1367 different ready-made combinations to select from. You can select just what you want in height, width, number of legs, drawers, shelves, tops, etc., and have delivery at once.

No delay for special designing and building; no waste of money or time in what is really experimental. You avoid possible later disappointment; you know exactly—in advance—what the cost will be.

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*Makes a full line of
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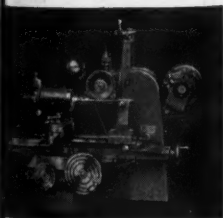
**EG-10
EXTERNAL**

Power or Hand Feed
8" Between Centers

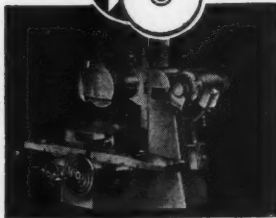


**IG-10
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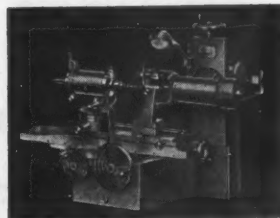
Power or Hand Feed
Grinds $\frac{1}{8}$ " to 3" Holes



FG-1 FLUTE GRINDER



S-1 SURFACE GRINDER

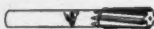
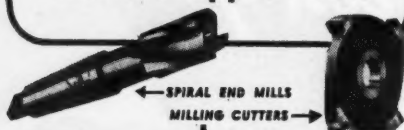


TRS-1 CUTTER GRINDER

H A N D F E E D O N L Y

GRENBY MANUFACTURING CO., PLAINVILLE, CONN

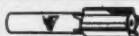
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JOBBER REAMERS



END MILLS



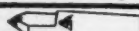
**COUNTERBORES
 and SPOTFACERS**

**FLY
 CUTTERS**



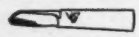
CUT-OFF TOOLS

**GRINDER HALF
 CENTERS**

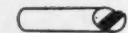


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**INVERTED TAPER
 SHANK ROUTER BITS**



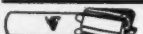
**SHELL
 END MILLS**



BORING TOOLS



**ROLLER TURNING
 TOOLS**



SPIRAL END MILLS



ROUTER BITS

New flute angles. New fillet designs. New shank designs — plus 25% longer carbide tips on all round tools. **WENDT-SONIS COMPANY**, Hannibal, Missouri, or **BRANCH WAREHOUSE**, Long Beach, Calif.

NEW CATALOG lists new tools. Latest prices. Write today for your **FREE** copy.

WENDT SONIS

CARBIDE TIPPED CUTTING TOOLS

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 TOOL BITS • MILLING CUTTERS • REAMERS • ROLLER
 TURNING TOOLS • ROUTER BITS • SPECIAL TOOLS

Surface Combustion Carbottom Furnaces. A four-page folder featuring typical installation views and application data regarding Surface Combustion Carbottom Furnaces for heat treating large workpieces such as castings, armor plate, weldments, and so on, is announced by Surface Combustion, Toledo 1, Ohio. Copy of Folder SC-115 free upon request.

Armstrong Fiber Sheet Packing Materials. Armstrong Cork Co., Lancaster, Pa., is now issuing a six-page folder describing and containing samples of fiber sheet packings, including a unique fibrated leather packing designated as the No. 841, a gasket material for general use designated as the No. 1242, and a new noncorrosive gasket material designated as the No. 743. Copy of folder free upon request.

"Flix"—a hand-sized, semi-quilted pad containing an effective absorbent substance that is said to quickly remove all types of oil and grease from the hands and arms, leaving them clean and dry—is the subject of a six-page illustrated folder now available free from Waverly Petroleum Products Co., Philadelphia 6, Pa., or Refiners Lubricating Co., New York 1, New York.

Allis-Chalmers Textrope "Magic-Grip" Sheave is the subject of a four-page bulletin released by the Allis-Chalmers Mfg. Co., Milwaukee 1, Wis. Illustrations show quick and easy manner in which sheave can be mounted on and removed from motor shaft. Copy of Bulletin B6310 free upon request.

Factory Trucks and Trailers. A six-page section for the industrial handling equipment catalog offered by the H. L. Pitcher Co., 12400 Strathmoor, Detroit 27, Mich., has been released by this firm. The second to be published, this section includes illustrations and descriptions of a new model automatic dump hopper mounted on casters, four models of heavy duty (wagon type) trucks, 16 miscellaneous models of steel boxes, baskets and platform skids, truck trailers, and four models of specific purpose trucks. Copy free upon request.